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[OFFICIAL NOTICE.]

### Where to Find the Western Gas Association's Exhibit, and the Custodian Thereof, at the World's Fair.

To the Fraternity: The exhibit of the Western Gas Association, at the World's Fair, St. Louis, is located in Section 33A, Liberal Arts Building, where Mr. Fred. R. Persons, who is in charge of the same, will always be on hand to receive visitors and to explain anything that requires explaining.

[NOTICE.]

### Twelfth Annual Meeting, Michigan Gas Association.

JACKSON GAS COMPANY,
JACKSON, MICH., July 20, 1904.

To the Members of the Michigan Gas Association: Preparations for the meeting of the Michigan Gas Association, to be held in Jackson, September 21st and 22d, 1904, are now well underway. The following papers are promised definitely:

"Retort House Practice in a Small Works," by Mr. George C. Turner, Secretary Coldwater (Mich.) Gas Light and Fuel Company.

"Temperatures as Applied to the Production and Purification of Coal Gas," by Mr. V. F. Dewey, Asst. Supt., Detroit City Gas Company.

"Commercial Lighting," by Mr. R. Schacklette, Manager Adrian (Mich.) Gas Company.

"The Formation of Naphthaline in Coal Gas," by Messrs. E. H. White and Samuel Ball.

In this connection let me call your attention to the "Question Box," with its special feature known as the "Trouble Box," which is in charge of Mr. E. F. Lloyd. Every member can help make this special feature a success by sending to Mr. Lloyd good, live questions or by relating their experience, or by asking help on the troubles they have had during the past year. If you have no questions to ask, no new experiences during the past year, and have encountered no troubles, this "Question Box" cannot help you. If the contrary is true, write to Mr. Lloyd, and *do it now*. Remember, all these things will be referred to some member for investigation, all of which takes time, and you should be as prompt as possible in communicating with Mr. Lloyd.

Don't forget to bring an application for membership from some fellow not now in the fold, and *be sure to attend the meeting yourself*.

Wishing that I will have the pleasure of welcoming you in Jackson,

Yours very truly, S. E. WOLFF, President.

[OFFICIAL NOTICE.]

### Wrinkle Department, Western Gas Association.

OFFICE OF EDITOR WRINKLE DEPARTMENT,
ST. LOUIS, MO., July 25, 1904.

To the Members of the Western Gas Association: We again invite contributions to the Wrinkle Department of the Western Gas Association for the meeting of 1905. The Editor wishes to call the attention of the members of the Western Gas Association, and of the gas fraternity at large, to the fact that the "Western" has done good work in this de-

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partment in the past; that its Wrinkles have been of value to many, and that it proposes to continue the good work.

The Editor further wishes to suggest that an earnest effort be made to improve the quality of the Wrinkles submitted, as a great many of the devices, while of undoubted practical value, are such as any gas works' foreman should know. We desire the Wrinkles which have a greater bearing on the scientific and technical portion of our business. Of course, there will always be room for the little, handy, practical devices, which so often help us over the rough places. We will gladly receive them, but we should all aim to place the gas business on a par with other scientific and engineering enterprises which are practically in a basis of exact knowledge and high efficiency.

To that end, therefore, we desire to secure a large collection of Wrinkles for the 1905 meeting. Give us the benefit of the mathematical, chemical, thermal and other devices which have helped you in designing or improving your plants; do not hesitate to send in the practical devices which are not on record so far; submit the ideas which have made the business end a success; and, finally, let every individual contribute his portion, so that the result may be worthy the achievements of the past, and a credit to the Western Gas Association.

The following wrinkle is submitted as a sample to guide others somewhat in working out their contributions to this department. This describes a method of regulating the pressure on the outlet of a holder in proportion to the rate of sendout, and was contributed by the writer to another Association some time ago.

"The essential idea of street pressure regulation is to maintain a certain pressure at the consumers' meters within a small percentage either way of the fixed pressure. As the consumption increases or decreases, the holder pressure should be raised or lowered. This is usually done by having recording pressure gauges located in the district supplied by the holder, and raising or lowering the holder pressure until the best average for the district is reached.

"Now, it is, of course, true that the same conditions of consumption never obtain on successive days or months, and, therefore, the following automatic indicator was suggested by the writer: In the outlet pipe of the holder we place a Pitot tube facing the holder. Naturally, the opening from the Pitot tube which faces the stream of flowing gas gives the pressure due to the sum of the static head plus the impact or velocity head, whereas the side openings give the pressure due to the static head only. Therefore, any variation in the rate of flow of the gas is at once indicated by the variation in differential pressure from the two openings of the Pitot tube.

"By using a very sensitive differential pressure gauge, we can thus observe this variable rate of flow. It is, of course, necessary to calibrate the instrument for each holder to be able to tell what pressures to carry on the outlet pipe for each division on the sensitive differential gauge, and it would probably be well to check this three or four times during the year. The Laclede Gas Light Company has so far secured three satisfactory types of extremely sensitive differential pressure gauges, and we have arranged them with two scales, one of which shows the divisions in millimeters and the other gives the proper pressures to be carried on the holder outlet opposite the indicator on the gauge. The writer purposely refrains from adding drawings or too much detail to the above description, as he merely wishes to submit one idea, which he hopes will suggest many others to help swell the contributions."

We must start the work at once; therefore, please send your ideas to the Editor, 716 Locust street, St. Louis, Mo., and oblige, Yours truly,

W. A. Baehr, Editor Wrinkle Department.

## BRIEFLY TOLD.

Some Random Notes from the World's Fair.—"World's Fair, St. Louis, Mo., Sept. 6th. Dear Journal: Messrs. Paul Doty, of St. Paul, Minn., and Thos. D. Miller, of New Orleans, La., are the American out-of-town members of the International Jury of Awards, appointed by Chief Hurlburt, of the Palace of Manufactures. Messrs. W. A. Baehr, Chief Engineer of the Laclede Gas Light Company, and O. O. Thwing, Engineer Station B, same Company, are the local members of the Jury. This body, under Chief Hurlburt, will number 400, and is divided into sub-juries, which will judge all of the exhibits in the varied palaces dedicated to industries and manufactures. It is common remark that the Chief deserves great credit for the judgment shown in selecting the many appointees. Certainly the gas men must concede that, in his selection of their representatives, no cavil may justly lodge. Going beyond that, however, it is only fair to say that the appointees on all awards are well fitted for their assigned tasks. It is estimated that the work of judging will take up at least two weeks' time of the judges. Mr. E. G. Cowdery, Vice-President and General Manager of the Laclede Gas Light Company, is an appointee of Colonel J. A. Ockerson as juryman in the Palace of Liberal Arts. The Western Gas Association, with its 80 exhibitors, is the only strictly gas exhibit in that building. The British section in the Palace of Liberal Arts has two or three very fine cases of samples of coal tar products. The quantities enumerated as outputs are little short of enormous. It is understood that the reports of the juries will be ready for publication some time this month. Anyone would be surprised to note the real interest manifested by the general public in the display carried on under the auspices of the Western Gas Association. The varied and many styles of ranges, cookers, water heaters, and especially the burners, interest them most. We had a fair sprinkling of foreign gas men here studying our methods of making gas and of the apparatus that goes with the same. The attendance steadily increases.—F. R. Persons."

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Association Amenities.—It is our general rule to abstain from criticism of the literary values of some, in fact of all, of the papers read before the various gas associations, as the difficulty experienced by the latter, in securing good papers for presentation at their meetings, or even to get enough of any kind, is already sufficiently great, without our increasing it by any sort of criticism. We recognize also that the matter treated of is of far more importance than the manner in which it may be presented, and that it is not given to everyone "To clothe his remarks with that elegance" to which the lamented Captain W. H. White facetiously referred last June, in St. Louis. No such feelings, however, restrain us in the case of one who must himself be near the sere and yellow leaf, and cannot be excused on account of his tender years. We refer to the paper on "Gas History," read by Mr. T. R. Parker, at the last meeting of the Pacific Coast Gas Association, and more particularly to that part relating to the older members of the Association. It is not pleasant to be flippantly reminded of our "approaching end," even by one who may only be our junior by a few years, and the doubtful taste, if not to name it other, shown in the reference to these members, will not be relished as whole by either young or old. Passing over such bathos as "The innumerable caravan that moves to the pale realms of shade," to that passage, referring by name to the older members, "Who still remain, like leaves in December, and are still flickering in the top of the genealogical gas tree, waiting for the inevitable blast." Several of these men are personally known to us, and the comparison seems scarcely apposite, as their faces remind us more of the gnarled oak, and the fall pippin, than of the December leaves. In striking contrast to these ill-timed pleasantries, are the words of Mr. F. H. Shelton on "Obituaries," in his presidential address to the Western Gas Association, the careful reading of which is commended to Mr. Parker.

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A Noteworthy Special Plant.—Mr. Maurice Graham, of Graham, Morton & Co., Leeds, England, writing under date of August 21st, thus describes a contract erected by his Company at the Gas Light and Coke Company's Works, Beckton Station, London: "This contract covered the supply and erection of a complete coal-handling plant, in connection with the new charging machines for charging the retorts in one of the Beckton extensive retort houses. It consists of a receiving hopper, jigging feeder and 2-roll crusher, one cased-in elevator, with receiving hopper and delivery shoot and one large coal storage bunker together with all structure for supporting the whole plant, all necessary gearing and electric motor. The coal is tipped out of wagons into the receiving hopper where it is jigged into the crusher. The jigging shoot is arranged so that the small coal is bye-passed direct into the elevator boot, the large coal being passed on to the crusher, from which it falls into the same receptacle. Thence it is elevated into the bunkers, placed over the charging stage of the retort house. The bunker is provided with a slide and levers so that the charging machines can be filled at will."

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Notes——

Write to the General Gas Light Company, of Kalamazoo, Mich., for a copy of its certainly handsome fall catalogue. It is really a work of art. It is accompanied by a trade price list.

The proprietors of the Everett (Wash.) Gas Company report a marked increase in output, and Superintendent Hall may have to suggest to his employers that an addition to the main system would not be out of reason.

It is gravely announced that the Grand Rapids (Mich.) Gas Light Company has determined to award "prizes of $1 each" for all suggestions made by employees that are adopted by the Company. One dollar!

[Continued from Page 369.]

## TWELFTH ANNUAL MEETING, PACIFIC COAST GAS ASSOCIATION.

HELD IN MECHANICS' INSTITUTE, SAN FRANCISCO, CAL., JULY 19 AND 20, 1904.

FIRST DAY—JULY 19—AFTERNOON SESSION.

The President—I now have pleasure in calling on Mr. C. H. Pennoyer, of San Jose, Cal., to read his paper on

### EFFECTIVE STEAM PLANTS FOR GAS MANUFACTURE.

In treating the subject of this paper I shall confine myself to the presentation of a description of a modern steam equipment and the operation of the same in connection with moderate sized, crude oil gas works. It has been brought to the writer's attention by means of papers read before gas associations that some gas manufacturing institutions, having certain by-products that could not be commercially disposed of, considered that these residuals were, therefore, of no value except for fuel, and that for this purpose they were in excess of requirements. In consequence of this method of reasoning, no special attention was given to the steam equipment or its efficiency.

At the present period, with the modern methods of accounting in vogue in most well regulated gas corporations, where an accurate account is kept and checked of all materials entering into the manufacture of gas, whether it be for gas making, blasting or boiler fuel, it becomes at once apparent that it is necessary to look well to economies in the generation of the steam used.

To be able to keep the cost of steam production at the minimum point we must have: First, the best boiler for the work in hand; second, the furnace arranged to most economically handle the fuel to be used; third, properly installed and well insulated steam pipes, exposed boiler parts and fittings; fourth, efficient translating devices, such as engines, pumps, etc.

*Requisite No.* 1.—*The Boiler.*—This piece of apparatus should be of a good water tube type, erected on a substantial foundation to prevent settling. I say water tube boilers, because, if of good design and well constructed, they are light, powerful, compact and well adapted to this work. There are many forms which differ only in detail and method of construction, but all have the following parts and principles: The steam is separated from the water and stored in a drum which is comparatively large in order to secure a storage capacity for hot water and a large surface for the disengagement of the steam. A large portion of the heating surface is composed of tubes of small size containing water and steam. The tubes are connected by pipes to the steam and water drums and also to a mud drum at the bottom. The hot gases from the fire are conducted among the tubes and after losing a portion of their heat they come in contact with the steam drum.

The general advantages of a water tube boiler are as follows: The heating surface next the fire facilitates the transmission of the heat and prevents overheating. The draft area, which is limited in fire tube boilers, is the whole chamber in which the tubes are inclosed. This permits sufficient time for the absorption of heat from the gases prior to passing into the stack.

Riveted joints are removed from the fire, a very desirable feature, since the double thickness of metal when exposed to the direct action of the flame causes serious difficulties; owing to their weakness, all strains of unequal expansion are concentrated there. The steam enters one end and leaves the other end of the drum, therefore, the steam and water are completely separated. The water tends to circulate rapidly in one direction and it is due to this fact that the chance to deposit a sediment is reduced to a minimum. Water tube boilers are rapid steamers, owing to the fact that the water is divided into small streams and is thereby brought into intimate contact with the heat.

Another feature is their safety. They possess good circulation, so that no part is exposed to the fire that is not covered with water. The water is so divided into small masses that serious results do not follow in the event of rupture, since the thermal storage is small. The walls of the boiler should be so arranged that the radiation of heat by them will be as low as possible. The most efficient method of reducing this radiation is by means of hollow wall construction. The writer has had occasion to employ this method recently on two boilers erected at the San Jose works, and the difference of temperature of the external surfaces of the bricks of two adjacent boiler walls, one being solid and the other hollow, is very appreciable. The space intervening between the bricks of the two walls is about 2 inches. If the boiler is of the water tube type, the drum should be well covered with blocks of magnesia or asbestos at least 2 inches in thickness.

At the San Jose works of the United Gas and Electric Company there are installed two Babcock & Wilcox, semi-marine boilers. These boilers were selected on account of their compactness, style of furnace (being well adapted to oil burning), ability to raise steam quickly, safely, and, on account of the liberal steam space, enabling the rapid delivery of dry steam.

These two boilers are arranged in a battery, and in place of the steel till and asbestos lined jacket or housing employed in marine work, the brick wall of the "landsman" is substituted. The tubes are arranged in 9 sections each having seven 4-inch, wrought iron tubes, 12 feet long. The steam and water drum is 42 inches in diameter by 6 feet 7 inches in length, and, together with the tubes, is built for operation at 160 pounds per square inch. Heating surface is 935 square feet and grate area 33⅓ square feet for each boiler.

The tubes of the semi-marine, Babcock & Wilcox boiler incline toward the front of the setting, the mud drum being located directly over the front doors instead of at the rear, as in the ordinary type of Babcock & Wilcox boiler. The advantages gained by this arrangement of the tubes will be spoken of later on under the head of furnace. All pumps, whether for feed water or fuel oil, should be in duplicate.

An injector should be installed in case the unexpected happens. This piece of apparatus should not be used continuously, on account of its low efficiency as a pump. When feeding a boiler it has a thermal efficiency of nearly 100 per cent., since almost all of the heat of the steam passes to the water. Where the water is bad, the feed water should be taken from a tank in which the water has been mixed with a compound and allowed to settle the scale and impurities out of it. It is far better to prevent the impurities from entering the boiler by following this practice than to inject compound in with the feed water and neutralize it on the interior of the boiler. If the steaming efficiency and safety of the plant are of importance, too much attention cannot be given to the feed water and the proper way of handling it. All plant managements should have their boiler water analyzed and proper preparations then employed to precipitate the impurities. The exhaust of the blower engines and pumps should pass through a closed heater and the water therefrom should be taken to a hot well, where, after it has been filtered, it can be added to the water in the feed tank. The introduction of feed water at a high temperature increases the economy and tends to prolong the life of the boiler. The injurious effects of unequal expansion are diminished when the feed water is warmed and the saving of fuel is considerable.

*Requisite No.* 2.—*The Furnace.*—If oil is to be the fuel used, a furnace arranged as indicated in the above described Babcock & Wilcox, semi-marine type of boiler would be the most economical in point of fuel consumption. The lower ends of the tubes are in the reverse position of the standard type of Babcock & Wilcox boiler, being at the front, where the oil burners are introduced. From this it will readily be seen that as the chamber recedes it becomes higher with the upward incline of the tubes, increasing in volume, thus giving the sprayed oil an opportunity to become heated to the propor temperature for combustion before coming into contact with the tubes. We are thereby enabled to secure more complete combustion than if the oil were introduced into a furnace which contracted toward the rear and brought the unconsumed gases into contact with the comparatively cool tubes before being elevated to the requisite temperature for complete combustion. This furnace arrangement is called the "marine furnace," and its superiority over the standard furnace has been demonstrated at from 8 to 10 per cent.

At San Jose lampblack is the principal fuel. This is burned in a manner similar to that employed in disposing of breeze, etc. A grate bar, having slots ½ inch wide, in 3 sections, each 8 inches long, and spaces ⅛ of an inch wide, being used. The lampblack is allowed to drain before being used and is then mixed with the heavy tar from the seals and the partially consumed and coked lampblack from the ashpit. The unconsumed coke helps to separate the remaining water from the lampblack and assists in a more rapid ignition.

The lampblack contains 30 per cent. of water when ready for firing. One cubic foot of lampblack when taken from the box weighs 75 pounds, and when thoroughly dry weighs 30 pounds. When in this condition (*i.e.*, corrected moisture) it has a heating value of 14,200 B.T.U. per pound (Parr calorimeter). Each 1,000 cubic feet of gas made will produce 16 pounds of dry lampblack, having a heating value of 227,200 B.T.U., which is equivalent to 12 pounds, or 1½ gallons, of 14 gravity oil in thermal value.

*Requisite No.* 3.—*Steam Pipes and the Insulation of Steam Piping.*—The steam piping must be very carefully erected. Pipes should be large enough, well lagged, and calculated so that there is little friction

and condensation. If the steam header or main pipe is long or large, provision should be made to take care of expansion and contraction, so as to prevent leaks and injuries to the pipe. A bend or elbow will allow the pipe to expand without injury to itself or boiler. The most common and best methods are the copper bend or inverted "U."

Particular attention should be paid to the covering of all steam pipes, headers, etc., incasing all overhead pipes with sectional magnesia covering. By comparison a bare pipe loses by radiation 85 pounds of steam per 100 square feet of pipe surface exposed (1-horse power—30 pounds by 2.819 for bare pipe) against (400 by 30)—12 pounds for a pipe covered with 1 inch of magnesia.

Most gas works have more or less underground steam pipes which must not be overlooked. These should be carefully boxed and the boxing filled with some efficient insulation. In some instances charcoal is used, sometimes ashes, or at times a more expensive material. Oil gas plants making lampblack can well afford to use some of this by-product for the purpose of preventing radiation of heat, for according to some experiments of Professor Ordway (Transactions A. S. M. E.; also Circular No. 27, Boston Manufacturers' Mutual Fire Insurance Co.) lampblack is a very good non-condutor of heat. Professor Ordway's experiments consisted partially of determining the number of pounds of water that could be heated 10° F. per hour through various substances 1 inch thick; heat applied 310° F. The following is an extract from his list of tests:

| | |
|---|---|
| Live geese feathers | 9.6 |
| Loose wool | 8.1 |
| Light carbonate of magnesia | 13.7 |
| Asbestos paper (wound tight) | 21.9 |
| Loose calcined magnesia | 12.4 |
| Cork charcoal | 11.9 |
| Loose lampblack | 9.8 |
| Pine charcoal | 13.9 |

From this we see, according to Professor Ordway's experiments, that we have in lampblack a very good material for filling boxes containing underground steam pipes, as it ranks third in the order of best insulators. It is, in fact, first, because of the low ignition point of the first 2 mentioned insulators of heat.

*Requisite No. 4.—Engine and Pumps.*—The pumps for handling the oil should preferably be double acting, with metal valves, and of the style manufactured by the Worthington or Snow Companies. Boiler feed pumps should be of the best make available and outside packed and installed in duplicate. Engines for blowers should be as simple and strong as is consistent with economical operation. The steam pipe supplying steam for their operation should be carried to the operating floor so that the operator may have control of all of the apparatus without being forced to take unnecessary steps. If the throttle control is mounted on a neat stand similar to the generator steam and oil control, it helps to enhance the orderly appearance of the generator room. Exhauster sets can be made quite efficient by employing direct connected outfits with governing float. For fans for supplying various pressures to the mains small automatic engines can be best employed. While electric motors may in some cases work out a saving in cost of operating a few of the auxiliary pieces of apparatus in and about a gas works, their economical utility in most instances is doubtful.

When it is taken into consideration that if electric motors are employed, steam engines and boiler capacity must still be retained for use in the event of interruption of the current supply. This means duplicate investment to begin with. Next, we would probably have to work the boilers at a lower point of efficiency when the motors were operating in order to have ample capacity during an electrical shutdown. The cost of the additional fuel required for the driving of the auxiliaries would ordinarily amount to considerably less than the cost of the current for motors, even though we charged the current to the gas works at 1½ cents per kilowatt hour. For example, we will take a 5-horse power engine operating 10 hours per day and consuming 35 pounds of steam per horse power per hour:

5 × 10 = 50-horse power hours.

50 × 35 = 1,750 pounds steam for 10 hours.

One pound of oil will evaporate under actual conditions not less than 10 gallons water:

$$\frac{1,750}{10} = \frac{175}{7} \text{ pounds of oil} = 25 \text{ gallons.}$$

25 gallons at 1½ cents per gallon = 37½ cents.

Five-horse power motor operating same number of hours:

5 × 10 × 750 = 37.5 kilowatt hours.

37.5 kilowatt hours at 1½ cents = 56¼ cents.

These figures show an advantage in use of the steam engine over the motor amounting to 33 per cent. in this instance. If, however, it is a matter of convenience rather than economy, or if the needed power is at some distance from the boiler plant, then there is no other choice but the motor, as it requires so very little attention and is the cause of much less annoyance than a gas engine.

The writer regrets exceedingly that he is unable to give at this time a report of the comparative tests of a 54-inch by 16-foot horizontal tubular and a Babcock & Wilcox, semi-marine boiler, using both oil and lampblack as fuel.

*Discussion.*

Mr. Jones—I am very much interested in Mr. Pennoyer's paper, and can see that when a man is adopted into our gas family he assimilates very quickly, and by spending time in the gas works, as Mr. Pennoyer has in San Jose, he came in touch with a great many truths, and I am glad to know he kept his eyes open. The use of lampblack as boiler fuel, of course, is general among our plants. We have learned the value of lampblack. We do not consider it for a moment as a waste product. It may be of interest to you to know that out of the lampblack residual of our oil gas making we have succeeded in making an excellent oil coke. It contains 98.8 per cent. of fixed carbon. This coke was first made experimentally, but we are now constructing a system of coke ovens embodying modern ideas, and we hope to have them in operation at the Oakland plant in a few weeks. Everyone of our boilers fed by lampblack is giving excellent satisfaction. At first we had some trouble with the melting down of the cast iron bars, but with wrought iron bars we have obviated the difficulty. In regard to the use of lampblack as a non-conductor, I am pleased to see that Mr. Pennoyer has taken up Prof. A. Ordway's figures. Those figures are quite old, yet they are all true. The paper is many years old, and it should have been republished. It is now out of print. I remember one time in the East trying experiments with the insulation of some steam pipes where I was obliged to carry steam across a street from a gas works boiler to a holder, which in the East was covered by a circular brick building. It was a source of a great deal of complaint that the heat escaping from the steam pipe melted the snow on the street. Upon digging up the steam pipe and boxing it and filling the boxing with lampblack (I was obliged to buy it from an ink manufacturer), I found that the snow never melted where the pipe was so protected, proving that lampblack is the best non-conductor we ever had. At that time I did not think it possible that it would become a by-product of our method of gas manufacture.

Mr. Hollidge—I would like to ask Mr. Pennoyer what was the location of his mud drum?

Mr. Pennoyer—It is located above the first fire doors. In the semi-marine type the tubes incline towards the front and the mud drum is located at that point. The steam and water drum is at right angles with the tubes.

Mr. Hollidge—Do you not think that the water of the section should be tested in order to know what is necessary for your boilers.

Mr. Pennoyer—Certainly it should be. The waters of a locality differ very materially. We are using one sort of compound at the electric light works, and at the gas works (half a mile distant) a very different compound.

Mr. Lowe—As to how to make coke from lampblack, I will say lampblack may be considered as being as pure a coke as we can have. Lampblack is a carbon in a state of very fine sub-division, and if coke is to be made from same all that you can do is to take the particles and bind them so that they will be retained in commercial form. It would at this time take too long to go into details of the method of so doing.

Mr. Jones—I was about to reply to Mr. Hollidge's question. As Mr. Lowe truly said, lampblack is an ideal coke in itself. It is devoid of all volatile matter as lampblack, but as we get it out of our sets it contains enough tarry matter to bind it and properly coke it, so that even in a coal gas retort there is enough heat to fuse the material into a perfect coke and a coke sufficiently hard for use for metallurgical purposes. Our experience in Oakland was with the coking of lampblack in ordinary retorts, and we found that it could be done so successfully and produce an ideal open grate fuel (a fancy domestic fuel) we propose to make it commercially. If you take coke made from lampblack and its binding material, which contains less than 1½ per cent. of ash and is easily ignited, and place the coke upon an open grate, with very little kindling and without any blower to induce a draught, the lampblack coke will glow and burn until it is entirely consumed, with very little ash under the grate after it has been burned. The amount of ash (less than 1½ per cent.) is extremely small, so that with 100 pounds of fuel the ash would be less than 1½ pounds. It has the extra advantage as a

fuel of being so nearly pure carbon that the fire never goes out once it is kindled. The reason for a coal fire going out is that, as the carbon burns on the surface (which consists of carbon and earth ash) after the carbon has come into contact with the oxygen of the air the fuel becomes coated with ash and the oxygen of the air can no longer get the carbon to oxidize it; therefore, the fire goes out. But in the case of lampblack coke there is always fresh carbon presented to the oxygen of the air, so that combustion takes place and is continued until all the fuel is consumed. Twenty-four hours in an ordinary retort will produce a good, hard coke; but these figures I am giving you are experimental and were obtained in the making of coke in an extravagant manner. That is, in order to make coke properly from your lampblack, it should be made in a coke oven designed for the purpose.

Mr. Hill—I do not want to take up the time of the Association unduly, but I realize there are a great many small plants that have a bye-product in the shape of lampblack. At our plant we make more lampblack than we can possibly consume under our boilers for making the steam necessary to run our gas plant, and the result is we have such a quantity of lampblack that we do not know what to do with it. We do not run 24 hours. We have a coking device on our machine, and we can fill it up and run for 3½ hours and make all the gas we want. During that time we cannot make coke.

Mr. Jones—There is a point in the size of small oil gas sets where more lampblack is made than is necessary to raise steam. This is the case in works about the size of that in Marysville. Marysville is an ideal plant, and the man who is running it deserves a great deal of credit. He sells his excess lampblack to the woolen mills, which use it as fuel under the boilers. In the case of a plant which has a small amount of lampblack left over, it might be well to spread and partially dry it. It gives out its moisture rapidly and cakes readily so that it becomes a clear fuel. At present we are selling lampblack piled up and partly dried to our electric light department for running the boilers. Mr. Holberton who has charge of that department I think can tell you something about it.

Mr. Lowe—If you run an electric light plant, Mr. Hill, why don't you save up your lampblack and fire your electric light plant with it?

Mr. Hill—The trouble is we cannot make steam enough by firing with lampblack. We have to force our boilers along partially with oil in order to carry the load.

Mr. Lowe—At Hollister they do not make sufficient lampblack to fire the boiler alone. They run their gas works from the electric light boiler, and would have to wait a long time to get enough to run the electric light plant; therefore, they sell their lampblack to the farmers in the vicinity. You could do the same thing.

Mr. Holberton—We have the same difficulty of which Mr. Hill speaks. We could not use lampblack under our boilers at all times. We have to keep steam 24 hours a day and use lampblack when the load is light. At night under the other boilers we use oil.

Mr. Jones—Do you attribute that to the amount of water in the lampblack?

Mr. Holberton—You could probably build a boiler with a special setting to generate the proper amount of steam.

Mr. Pedersen—We have a number of plants in the State, and none of them can make lampblack enough to entirely supply the boiler for steam purposes. We put in an oil burner, make a bed of the lampblack and feed in oil at the same time, just enough to furnish the capacity required in the boiler. It worked very well in every instance. We never have any lampblack to dispose of and use oil at the same time. I think you could work in oil on the electric proposition where you have to have plenty of steam.

Mr. Pennoyer—It might not need so much oil if the lampblack were allowed to accumulate and dry, then fire the lampblack straight, then go to your oil.

Mr. Hollidge—What did the farmers around Hollister use the lampblack for?

Mr. Lowe—For firing steam and pumping plants in the valley.

Mr. Pennoyer—You would not suggest taking the lampblack as it comes from the lampblack box with 60 per cent. of moisture and throwing it into the furnace?

Mr. Lowe—No, decidedly not. I wish to move a vote of thanks to Mr. Pennoyer for the able paper we have heard. (Carried.)

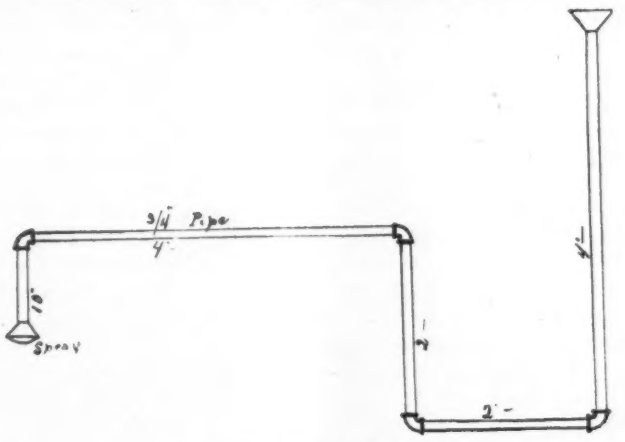
Mr. George S. Colquhoun, Editor of the

WRINKLE DEPARTMENT,

read the following budget:

I want to take the opportunity of thanking the members who have so kindly helped me to gather the Wrinkles for this our Twelfth Annual Meeting, and hope that the members will remember the Wrinkle Department as generously next year.

No. 1.—*A Device for Clearing Naphthaline at Outlet of Holder.*—By Mr. John D. Kuster, Colusa, Cal.—This device was used when we had naphthaline trouble at the outlet to the holder. When the holder is full, insert the pipe under the edge and into the pipe, if it is at any

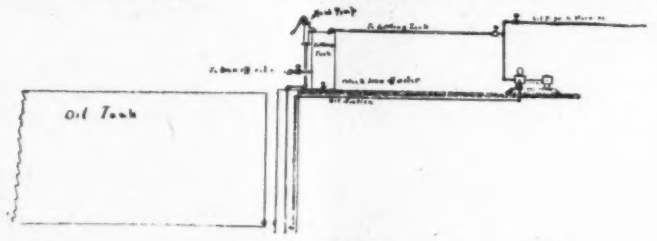



**Wrinkle No. 1.**

reasonable distance from the edge. The dimensions given on the illustration attached we found necessary for our purpose. With a funnel you can pour in gasoline or kerosene, which seems to cut any ordinary deposit.

No. 2.—*Device for Saving Time and Labor in Dictating Letters.*—By Mr. Vanderlynn Stow.—In dictating letters I use a numbering machine. The letter bearing the number put upon it by the numbering machine is handed to the stenographer who takes it with her notes. Letter No. 1 in each day's correspondence stands for itself and the machine is set so that the next letter is numbered No. 2. Thus, the letter which I am answering from you would be, say, No. 1. Formerly my method was to say to the stenographer: "Answer letter from the Pacific Coast Gas Association, dated March 24, 1904; address No. 1030 First street, San Francisco, Cal., attention Mr. C. E. Smith." Now, by using the numbering machine, I say to the stenographer: "Answer No. 1." The stenographer understands that No. 1 means all that I took time to say before and fills all that in without taking up my time to dictate it, or her own time to take it down. Elaborating on this again, if there is a particular paragraph I wish to call attention to in the letter, that paragraph can be numbered and the attention of the writer drawn to it without my taking up the time necessary to quote it to the stenographer.

No. 3.—*Settling Tank and Connections.*—We found the apparatus sketched very useful in disposing of the greater quantity of water which finds its way into our oil. We have tried to show how we can pump the water from two points. The oil pump is used if there is an accumu-



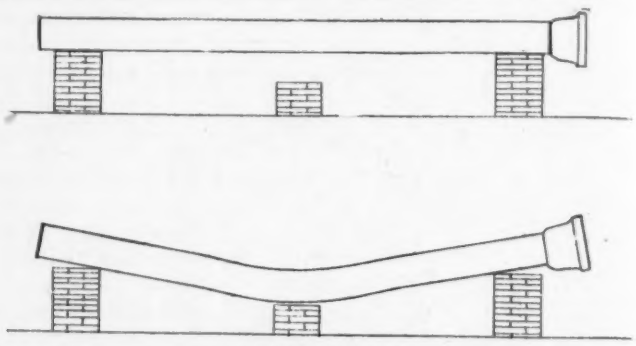

**Wrinkle No. 3.**

lation, otherwise the use of the hand pump once or twice a day is sufficient. We draw the water off in the trough until the oil appears, then allow the oil to flow back into the suction tank, or draw it off at the point shown half way up the settling tank.

No. 4.—*Exhaust Pipe and Muffler Paints.*—The following paints have been recommended as being able to withstand anything up to a red heat, and are, therefore, suitable for painting exhaust pipes and mufflers: Lampblack, 3 pounds; graphite, 3 pounds; black oxide of manganese, 1 pound; Japan gold size, 1 pint; turpentine, ½ pint; boiled linseed oil, 1 pint. Powder the graphite and mix all the ingredients to a uniform consistency. Give two coats. Or; black oxide of manganese, 2 pounds; graphite, 3 pounds. and terra alba, 9 pounds. Mix and pass through fine sieve, then mix to required consistency with the following compound: Sodium silicate, 10 parts; glucose, 1 part; water, 4 parts.

No. 5.—By Mr. E. C. Jones.—When a large gasconsuming territory has grown in area without the provision of feeding mains for equally distributing gas throughout the territory, it becomes a serious problem to supply increasing demands for gas and give good service. For example: If, owing to a large amount of friction, due to small mains, the maximum pressure of a 3-lift gasholder is necessary to provide satisfactory service, the difficulty is increased, because at the time of greatest demand for gas it is extremely difficult to have the heaviest holder in the city on the third lift. It is more apt to be on the first lift, and oftentimes the demand for gas is supplied by other lighter holders contributing their share at a lower pressure. This combination of circumstances occurred in Oakland last winter, and the difficulty in handling it was increased by the rapid growth of the business due to a reduction in the price of gas. The main gas supply of the city was fed from a 3-lift holder giving a pressure as follows: Third lift, 7 inches; second lift, 5½ inches; first lift, 4½ inches; and a 2-lift holder giving 4½ inches on the second lift and 4 inches on the first lift. It became necessary to mechanically increase the initial pressure on the city to a point equal to the pressure of the third lift of the heavier holder, and in casting about for a means of doing it every type of positive mechanical exhauster was examined and found not to be suited to the requirements, as it is an unusual practice to place an exhauster directly in the only feeding main of a large city, as there are so many small happenings, such as the slipping of a belt, the stoppage of power, etc., that might cause the exhauster to stop and the cessation for a moment would shut the gas off from the city, as the exhauster at rest acts as a closed valve. After a careful examination of the Sturtevant gas fan, it was decided to place a 20-inch fan directly in the line of pipe leading from the outlets of the holders and to use an electric motor to run the fan. The inlet of this gas fan was connected to the outlet of each gasholder and the fan was further provided with a by-pass. The fan installed has a capacity of 460,000 cubic feet of gas per hour, and a range of initial pressure up to 19 inches. In laying out the arrangement of fan and by-pass, it was calculated that, should the fan stop owing to any accident, the distance between the ends of the blades and the inside of the case of the fan was sufficient to give an area fully equal to the size of the holder outlet, so there would be no obstruction to the free passage of gas through the fan while it was not in motion. This proved the greatest source of satisfaction and confidence, and the only other question which arose that might interfere with perfect results was the regulation of initial pressure of the fan to the exact requirements of the district. This it was at first intended to accomplish by means of throttling the by-pass valve, which would require the constant attention of a man and possibly some annoying variations in pressure, when it was suggested by Mr. A. C. Beck, the superintendent of the plant, that the gas fan be placed immediately at the inlet of a 24-inch Connelly governor and that the governor would then take care of the proper reduction of the pressure from the fan. This, so far as we know, was without precedent, and was tried with some hesitancy. After the installation of the fan at the inlet of the Connelly governor, and with the by-pass valve open, the electric motor was started and the fan turned over at the rate of about 1,900 revolutions per minute. The by-pass valve was gradually closed, thereby putting the fan directly on the city, and the Connelly governor, without any special preparation or change in its mechanism, took hold of the pressure and reduced it to the normal holder pressure. After this, all that was required was to provide a number of lead weights for weighing the governor and increasing the pressure to any point desired. The high rate of speed of the gas fan precludes any pulsation of the gas in the street mains, and it was at first thought desirable to run the fan at its maximum rating and to leave the by-pass valve partly open. This was done simply to so increase the number of pulsations as to insure steadiness of the pressure, but with the by-pass valve open it was found that the governor did not do its work readily and there was considerable unsteadiness of the pressure. It was then decided to reduce the speed of the fan to about 1,050 revolutions per minute, which gave a pressure of 11½ inches on the inlet of the governor, to run with the by-pass tightly closed, and to depend entirely upon the governor for regulating the pressure. This fan was put into operation shortly before Christmas, 1903, and has been working satisfactorily since, and the required pressure is maintained upon the city mains, no matter what the height or pressure of the storage holders, and the gas service has been so much improved that the winter was passed without complaints of insufficient or varying pressures.

No. 6.—*Bending Cast Iron Pipe.*—By Mr. T. R. Parker, Napa, Cal.—I send you this rough sketch of an old wrinkle, not in general use,

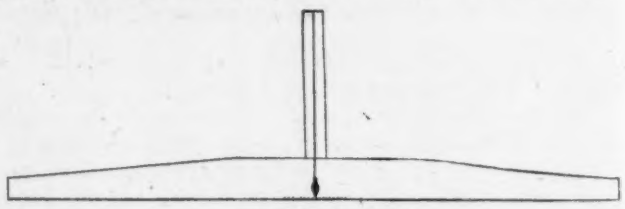


**Wrinkle No. 6.**

for few there are that think of bending cast iron. My first attempt was at a lumber camp in Calaveras county. Our cook could not bake bread in the stove oven on account of the crosspiece between the lids having become bent or warped so that it allowed too much cold air to pass over his oven. He asked me if I could straighten it. I thought the same medium that bent it could unbend it, so by putting it in the forge and getting it to a bright cherry red, then placing it on the anvil upside down, a gentle pressure from the sledge hammer brought it down straight again. So when occasion required to swing around a curve with nothing but straight lengths of cast iron pipe to do it, I have done this, building a fire around two or more pipes, as the case might be, letting them warp down until the center pier wall touches, then knock out your fire, using no water to extinguish it. I have made some very pretty bends this way for the water company, withstanding 150 pounds pressure. You pile the wood after the manner that a blacksmith heats his tires.

No. 7.—*New Use for Gas Engines.*—This is, I think, a new idea for use of gas. It is a high pressure water system for fire protection, in use in Philadelphia. This system is composed of large mains with suitable hydrants located in the business center of Philadelphia, connected with a pumping station on the Delaware river, where large pumps are driven with gas engines connected with the city gas mains. The water pressure carried is 300 pounds per square inch. A single stream from this system threw water almost to the top of a 21 story building, near where a test was being made. The economy and efficiency of the gas engine for the purpose have been fully demonstrated by Philadelphia, she being the first city to adopt gas engines for her pumping station. Other cities have used a similar high pressure water system, but not run with gas engines. This Wrinkle was taken from an article in the June number of *Popular Mechanics.*

No. 8.—*Grading Board for Grading Pipe Trenches or Leveling Ground.*—Tnis device can be made from an ordinary piece of lumber 6 or 8 inches wide and the desired length, with a piece about 3 feet long, attached at right angles and in the center of the grading board.

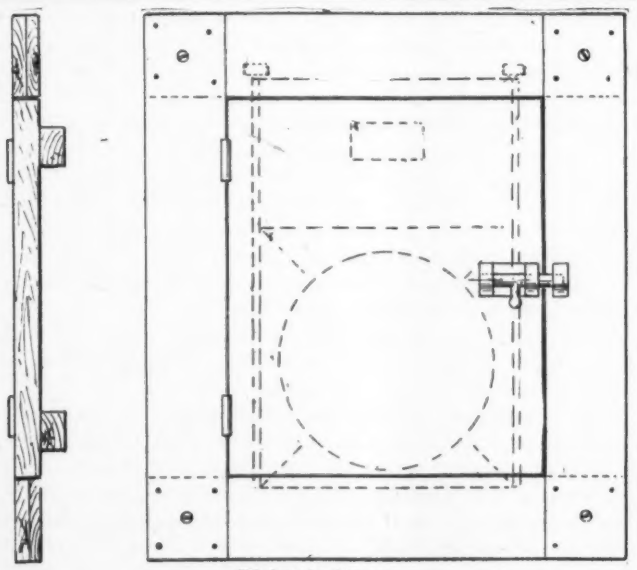


**Wrinkle No. 8.**

From the top of the small piece a plumb bob is attached, and by marking a scale on the bottom of the board and at the center, the plumb-bob will then indicate the grade.

No. 9.—*A Meter Door.*—By Mr. S. C. Lowe.—These doors are constructed of redwood, and after you cut a hole through the rustic under the porch, instead of saving the pieces of lumber to make up a door, I screw on one of these doors to the casing. This makes a very neat and quick covering, doing away with all carpenter work. The outer frames of the doors are constructed of about 1 by 4-inch surfaced redwood and halved together. The door is then fastened with an ordinary hinge to the frame and a bolt put on so that when the man goes to set the meter at a house where it can be gotten at from the outside, he always takes one of these doors with him, so that after he finishes the setting of the meter, a coat of white paint or any other color that the building may be painted with, applied to the door, will make a neat looking job.

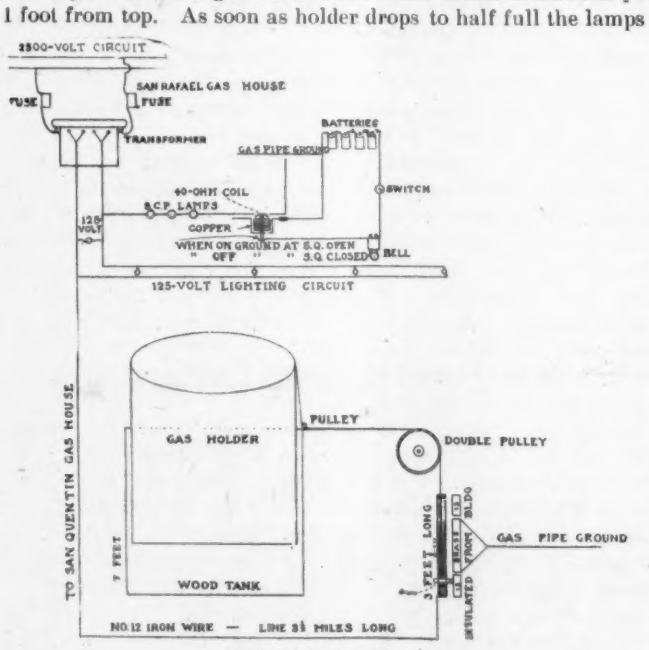
No. 10.—*A Time Saver in Repairing or Checkering Gas Apparatus.*—By Mr. E. Jones.—When a water gas or oil gas set needs lining or a re-



Wrinkle No. 10.

newal of the checkerbrick, it has been customary to cool the brickwork by blowing air from the blast pipe through the machine, and as the generator and superheater contain a considerable amount of lampblack, or carbon in other forms, the air has a blowpipe effect, burning the carbon and increasing instead of diminishing the heat, and at best the method employed is slow. Last winter it became necessary to quickly repair a large sized oil gas set in order to increase its gas making capacity, and the machine was needed to supply the city with gas. It was found that not more than 36 hours could be devoted to the cooling of the heavy linings and the checkerbrick, and the removal and replacing of a large quantity of checkerbrick. It was imperative that the repairs should go on, even though some damage might be done to the linings by cooling them too quickly, and this was done by admitting a large quantity of steam at the bottom of the generator, passing it over through the superheater and out through the stack valve. The steam was turned full on at the beginning and permitted to flow through the machine until the temperature of the lining had been reduced to the temperature of the steam. The steam, upon entering the generator, immediately quenched any ignited carbon, and the cooling effect began at once without any previous reheating. This experiment was tried with some little fear as to its effect, but it was found that no harm had been done to any of the brickwork, and at the end of 12 hours men were enabled to remove checkerbrick from the superheater 12 feet in diameter. Under methods previously employed, it would have required some days to cool the linings. Relying upon the success of this first experiment, this rapid means of cooling oil gas apparatus is now generally employed, with no bad results and with a great saving of time.

No. 11.—*Signal Line between Gas Works at San Rafael and Holder at San Quentin, a Distance of Three and One-Half Miles.*—Arranged so that lamps in series at gas works burn while holder is between ½ full and 1 foot from top. As soon as holder drops to half full the lamps go

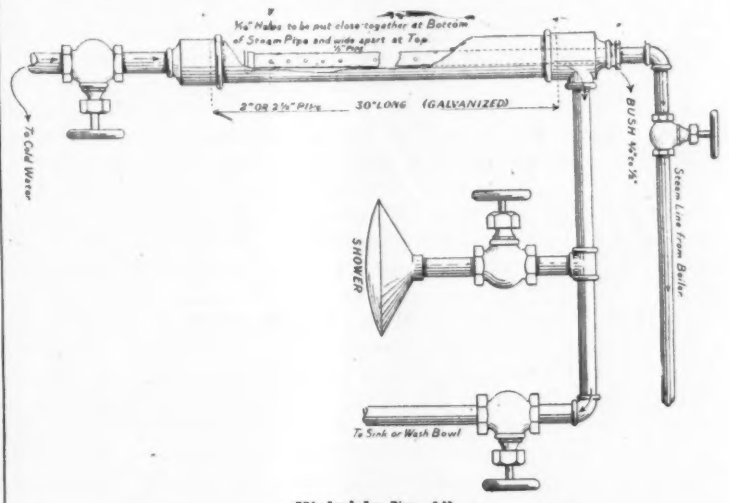



Wrinkle No. 11.

out and relay magnet opens, closing battery circuit on bell, which will continue to ring until switch is opened. The pump is started and as soon as holder is within 1 foot of top, bell will ring again. In this way holder is kept between ½ full and full.

No. 12.—*Steam-Jet Exhauster.*—By Mr. Wm. Henderson, Redlands, Cal.—When we installed the second holder it became necessary to use the old one as a relief holder. The holder gives a pressure of 48-10, while the relief holder without any weight had 20-10. The exhauster (of the regular steam-jet style) is placed between the relief holder and a scrubber which condenses the steam and takes out any tar that may have passed through the washer and scrubber. The gas then passes through the purifiers and into the distributing holder. Another benefit was noticed: When we had but one holder it was weighted to give 48-10 pressure, our machine would make 5,500 feet of 20-candle power gas per hour, taking between 11 and 12 gallons of oil per 1,000. After taking the weight from the holder and turning it into a relief holder we can make from 7,500 to 9,000 cubic feet per hour, and make 20-candle power gas with 9.5 oil per 1,000.

No. 13.—*Device for Warming Water for Shower Bath or Wash Basin.*—This device is made with a piece of 2-inch or 2½-inch pipe, 2 feet 6 inches long. At the lower end it is reduced to ¾ of an inch. Where the cold water enters at the upper end there is a reducing *T* to ¾ of an inch. The side opening is where the hot water is taken off to


¼" Holes to be put close together at Bottom of Steam Pipe and wide apart at Top
2" OR 2½" PIPE
30" LONG (GALVANIZED)
To Cold Water
BUSH ¾" to ¼"
Steam Line from Boiler
SHOWER
To Sink or Wash Bowl

Wrinkle No. 13.

shower or basin. At the top of *T* there is inserted a perforated tube of ¼-inch pipe with cap on lower end. This tube is connected with live steam line. You can get the desired temperature of water by adjusting the valves on the cold water and steam inlets. This will be found very handy, and a cheap shower for use at the works, or any place where steam is to be had.

*Discussion.*

Mr. Martin—I am sorry Mr. Jones treated No. 5 as a Wrinkle, for it was of enough importance to treat it as a paper. He is hiding his light under a bushel.

Mr. Valentine—I understand in Oakland they are using an electric motor for the driving fan. Now what is going to happen if the current fails and the people begin to use gas all over town?

Mr. Jones—What are you going to do in Sacramento?

Mr. Valentine—The same thing and then have a gas engine.

Mr. Doherty—It might interest you to know that in Denver there is the same arrangement with an electric motor, and that we intend to install both.

On motion of Mr. Martin a hearty vote of thanks was extended to Mr. Colquhoun for his labors in the Wrinkle department.

The Convention was then adjourned, until 10 A.M. of Wednesday.

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SECOND DAY—MORNING SESSION.

The convention was called to order by the President at 10:15 A.M.

RESPECTING THE VALUE OF EX-SECRETARY GRIMWOOD'S SERVICES.

The Secretary—Following the resolutions adopted by the Association yesterday, in the matter of the resignation of Mr. Grimwood as Secretary, I feel something more is due him than mere words of thanks to express the appreciation of the Association for the work that he did, covering a period of 5 meetings, or 4 years. I think we can very well afford to show that appreciation by giving him some substantial token of our feeling for him as a member of the Association and as one of

our most earnest workers. I, therefore, move you that a committee of three be appointed by the Chair to select some suitable testimonial to be presented to Mr. Grimwood as a token of our esteem and appreciation.

The President—I think, gentlemen, if anyone should have the honor of seconding such a motion, it should be the President, because it takes the executive of this Association to properly appreciate the ceaseless work necessary on the part of your Secretary in order to perform the duties of that most important office. During the time Mr. J. B. Grimwood occupied the position of Secretary-Treasurer, and more particularly during my term of office, I have been brought into close association with him, and I know there is not one among us who is more endowed with the true spirit of fraternity or with the love of his profession than is Mr. Grimwood. I am sure one of the most disappointing incidents in his career is that failing heath necessitated his resignation, and, still more, that he was so prevented from being present on this occasion. It is not usually the province of your President to make any remarks, but I felt called upon to speak officially on the great services rendered us by Mr. Grimwood.

The motion was unanimously carried and the President appointed Messrs. John A. Britton, L. P. Lowe and C. H. Pennoyer as the committee.

The President introduced Mr. F. J. Symmes, of San Francisco, who prefaced his paper on

LABOR

as follows: Mr. President and members: When our Secretary sent out the notice on a postal card that I was to speak to you on "labor" he did not carry with that concise expression of his a full explanation of the title of the subject given to me. The mere word "labor" gives no indication whether it is male or female, black or white, Chinese or union; but in the notice which was given to me I was asked to say something on the labor problem, a problem which is, I believe, the greatest and most important one before our country to-day. It certainly cannot be dealt with very completely in 15 or 20 minutes. However, what I have been able to prepare for the occasion I will submit to you.

It is quite natural for us to feel that our own events and experiences are entirely new and different from those which have occurred before, but such is not the case. The Greek and Roman babies were just as wonderful to *their* parents and grandparents as ours are to us to-day, and while we lie awake nights to evolve our "original" ideas, we discover later that they were in use hundreds of years before. Even the great labor problem of our present day is only a repetition on another scale of troubles of long ago, for whenever and wherever men have come together there have been differences of greater or less importance.

Iu the beginning men were savages; everybody "went it alone," and nobody cared a "tinker's dam" for his neighbor. Soon, however, the family relation strengthened, the tribal distinctions developed, and from that time on man's dependence upon his fellowman has grown in strength and importance. Associations of men in groups according to their mutual interests have existed throughout all civilization. Kindred relations and interests have *always* brought men together, and now we find them in every variety of association—churches, lodges, societies, brotherhoods, clubs and unions, and even parlors.

Among the earliest of these were the "guilds"—men worshiping and feasting together, helping each other in poverty and distress, and providing pensions for those advanced in years. Plutarch tells of them in the first century, the Greeks had them in the second and third, and they were common in the Middle Ages.

The Peace Guild, for mutual protection, was prominent in the 14th, and the social and religious guilds in the 15th century. All classes of men were members then, and even royalty took part, for Henry IV. and Henry VI. were each members of the Guild of Trinity, at Coventry.

The "guild merchants" and the "craft guilds" became the strongest in wealth and importance, until they reached to the point of great excesses and abuses, and the days of the Reformation weakened and destroyed them.

Wickliffe, in the 14th century, complained much of the abuses of the trade guilds. In France they were abolished in 1787, and in Germany lingered along until low water mark in 1869, when they had nearly disappeared. In Russia they never found a healthy soil for growth. Human nature has but little changed. The trade union of to-day is only the oldtime guild fitted to our modern conditions. Ours, however, is a fair-weather bird, which thrives only in the most prosperous times. It springs up then like a weed before the rain, but withers and dies before the heat of "hard times" and when the generous showers of capital fail. It is generally believed—for their leaders have vigorously preached it—that the labor union has been the cause of great improvements in the laborers' conditions, but how much their aggressive acts have stood in the way of *greater improvements* will probably never be known. A victory *after a battle* between labor and capital is usually only a truce. The most lasting peace after war is for those who live apart. Those who must live together must settle their differences by some other method if the settlement is to be a permanent one. And the best results always come from a conclusion arrived at by calm reasoning and a willingness to see and consider the other side. There have been many good reasons for the desire of labor to better itself, as the greed for gain and the opportunity for unjust men to hide behind the irresponsibility of the great corporation have too often tempted them to disregard the just rights of the laborer. On the other hand, the employers who have sought to better these conditions of their own accord are a constantly increasing number.

We have often been told that the workman can do more work in 8 hours than in 10 hours, if he is contented and in good humor, but how much more can be had out of capital when in good humor is seldom thought of, and it is a very serious question if the labor union has practically accomplished as much real gain for the cause as might have been secured by other methods.

Whether good or bad, however, the labor union is with us, it is here to stay—in a more or less active form according to the hard or prosperous times—and is a force to be counted with. It threatens in its most vicious form the health and prosperity of the nation, and if not a dangerous disease upon the body politic, it is a pretty severe affliction for a real blood purifier. As we have it now, the economic conditions are seriously disturbed, and no man may know with any certainty from day to day whether he can count upon his daily bread, his meat or his beer—or even a vehicle to convey him to his grave.

It is the problem of our time, not only from an economical and sociological point of view, but from the political standpoint as well, and by the aid of the selfish and unscrupulous representatives of the press the arraignment of class against class and the destruction of all natural friendliness between the employer and employee have been most unfortunate and will require many years to overcome.

The labor uniun of to-day is controlled by some of the shrewdest—if not the wisest and best educated—of our time, and for completeness and effectiveness of organization it is probably second only to the Roman Catholic church. It plays most effectively upon the sympathy of the public, the weakness of the politician and the timidity of the employer. It has now hoisted the dignity of the day laborer to a most conspicuous pedestal and tremendously emphasized it, and it has declared the royal trademark of labor to belong alone to such kinds of work as shall form a union and come into its federation. All else is "scab."

The professional organizer has gathered in the carpenters, the painters and the boiler makers, the scavengers, the chicken pickers and the grave diggers, the least intelligent, the least educated and the least American, rounded them up in their flocks and said to them: "We are honest labor; all else are 'scabs.' We *make* everything and should fix the price." And the more socialistic—who are always the foreigners—say: "We make everything and we ought to own everything. We are Labor. Labor is King. Let the King rnle. Work only when I tell you, and only as much as I tell you, and I will raise your wages, shorten your hours, and show you how to make capi tal obey your orders. I will teach you how to perform the minimum of work in the maximum of time at a large fixed wage. You may be without work at times and your family may be hard pushed for food, but they shall not actually starve. Together we will compel capital to admit us to a partnership, where our name shall be in all its windows and upon all its goods. We shall have a share in the profits, a control in the management and no responsibility for the debts. If you do *not* follow my dictation you are a 'scab' and a villian, you shall not be permitted to work *at all;* women and children will stone you in the streets and strange, bad men will find you when alone and they will break your bones and kick out your brains."

As a result of this kind of persuasion, practically illustrated, the ranks of the unions are kept full, and this is the "organized labor" which demands the "recognition" of the employer. To "recognize" it, we are told, is but a reasonable and simple thing to do. Once this this is done, however, we are forbidden to recognize any other kind; the law of supply and demand is set aside, and the new King will rule. By a "recognition" of such organizations there has been built up the extraordinary conditions of to-day. A single organization (the United Mine Workers) is said to have 350,000 members and $4,000,000 in their treasuries, and there are others nearly as strong.

This extraordinary force, developing continually in power, in influ-

ence—and in impudence—has compelled the formation of the other organizations to combat and restrain it—the citizens alliances, composed of different classes of people who recognize the necessity of a restraining influence, and the manufacturers' and employers' associations, composed of employers only. This counter movement was bound to come; capital has been compelled to organize for self-protection, and conflict ensues. We are now in the stage of conflict; skirmishes are common and great battles always imminent.

Citizens' alliances and employers' associations may not be above criticism, but they have their rightful place and a most important function to perform. They may seem radical and inclined to follow at times the methods of the other side, but they are organized for self-protection, and if compelled to fight they cannot afford to *hit soft* or to take any backward step.

As a result of the organization of capital, the organization of labor becomes more tractable and more reasonable in its demands. If the capital organization is reasonable (and from it everything in the way of reason and justice is to be expected) labor will become better educated and advanced and distinct progress will be made. The same old struggles will be gone over again, but the conflicts should be less and less severe. Time and experience bring wisdom to us all and time and experience are elements of importance in the future solution of this problem. Arbitration and conciliation boards perform an important part in the difficulty, but they are not a cure. They are of much value at critical times when the relations are greatly strained, because they call a truce, consume time and permit passions to subside and reason to develop; but a settlement other than by mutual, willing consent is not a finality, hence the *value* of arbitration is often overrated. A settlement of difficulties which does not settle the feelings is not a permanency, and settlements by arbitration seldom satisfy. First, it is a struggle to secure the vote of the "odd man," and it usually ends in a compromise, a kind of "split the difference" settlement, so that if one only makes his demands large enough at the outset he can always be magnanimous and shout for arbitration. If a man makes a claim for my entire suit an arbitration board will at least give him my hat. One great cause for all of this lies in the fact that most of us are cowards. The business man fears his neighbor may secure some of his trade if he has a tie-up of any kind; the politician fears to express himself before a growing political power; many of the courts are still more timid, and true laborer, the mechanic, fears for his job and his life if he does not join the union which he despises. The sharp manipulator of the labor forces knows all this and shapes his acts accordingly. The only man who isn't a coward is the one who attempts to exercise the God-given and American right to labor when and where he pleases, for he has to take his life in his hands to do it. He is stoned and jeered at as a "scab" by women and children; he finds but little support from the police or the courts, and it is only in rare instances he finds a friend, and then it is usually some citizens' alliance which attempts some little protection. It is a comparatively safe and easy thing to march to battle under the guidance of wise officers and beside many comrades, but to be prepared night and day for the cowardly attacks of a gang of sluggers requires the highest type of heroism. When the public determines to give to the free workman the protection and support which he deserves, the labor problem is solved, and the labor union goes out of the slugging business and settles down to its legitimate duties, the assistance, care and protection of each other under the law, and, something which never occurs to them now, the advancement and perfection of their trade.

The rights of the "open shop" are as clear as the constitution of a free country and the beneficent intentions of a Divine Father, and they never can be properly questioned. They should not be discussed.

An educated and cultivated people such as ours should be able to find a complete solution for the labor question without the sacrifice of our prosperity or plunging us into the distress of hard times. Much has been done and is being done in a more friendly and kindly feeling toward the laborer. Capital has valuntarily shared its profits, improved the conditions about the great factories, assisted to give better and more beautiful homes, and aided the sick and the unfortunate.

This will go on, even though in many places the work has apparently not been appreciated. On the other hand, we must not hesitate to raise the hand of resistance against all unreasonable demands. We must provide and yield to suitable boards of arbitration. All these things are steps toward a better future understanding, and they are all educational and useful. The bill, No. 53,529 of the 58th Congress, creating a national arbitration tribunal, should have our hearty support. It may prove a great help. The best progress, however, will be retarded until we repair our immigration fences. We cannot make good citizens out of the hordes of ignorant, vicious and depraved of other nations in less than two or three generations, if at all, and immigration restriction is very essential. We can use a large population of newcomers if they are the right kind, but the quality is far more important than the quantity. We need not be in such desperate haste to fill up the country, for we are doing very well as a nation, and that well enough should be let alone rather than to increase the disturbing element. We want our America for Americans, and with all the other problems which are before the people in addition to the labor problem, we need a constant upbuilding of character and a sturdy growth in good citizenship. We want to remember that happiness depends upon other things beside dollars and cents, and that this, like any other question, can only be settled aright, when it is settled, by honest, fair-dealing men, upon the lines of equity and justice, with a feeling of charity to all and malice toward none and an exact appreciation of "good will to men." This final solution may seem an ideal and a distant one, but we are making some progress toward it, and each must do his part.

*Discussion.*

The President—Gentlemen, Mr. Symmes, in his usual complete manner, hits the nail on the head. As he rightly observes, we are lacking in moral courage in the conduct of our business; but as this ia a large subject and covers large ground, there may be a diversity of opinion. A gentleman is here who yesterday told me he believed in the union and in having union gas companies. We want to hear from that man, and we want to hear from everybody who has something pro or con to offer on this most important subject, a subject that is dominating the mind of every thinker throughout the country. We should like to hear from Mr. Kahn.

Mr. Kahn—It has been well said, Mr. Chairman, by yourself and by the gentleman who read this most admirable paper, that the labor question, together with the consolidation question, with which it is so closely allied, occupies probably to-day the widest space in the thoughts of all good men, and unfortunately a great deal of time in the thoughts of a great many bad men. There is no doubt, Mr. Chairman, that labor, as we are wont to consider and speak of it, is largely sinned against as well as sinning. All men who defend and urge the claims of labor are not bad citizens; they are not bad members of society; they are not enemies of capital, and they are not necessarily friends of the labor agitator. Now let me say to you, gentlemen, that when we study the labor question we must never lose sight of the fact that it has two very large sides. We employers, representatives of the capitalists, are prone (as well we may be, inasmuch as we are human) to look at our side of the question and very rarely at the other side, and what is more, Mr. Chairman, some of us find it very difficult to look at the other side no matter how hard we try. It makes all the difference in the world between a man who has an income of $2,000 to depend upon and who has a certainty of getting his wages every day and the other fellow whose income is only $3 a day with no certainty that there will be employment next week; so that we will have gone far to solving the labor problem, in our own minds, at least, when we recognize that there is a very large other side to it. I have had the honor, Mr. Chairman, for 16 years now, to have been a member, and to have had a little to do with the organization of the National Stove Founders' Defence Association. It was organized in the city of Cleveland, I think in 1887. I did what little I could towards the organization of that body. I believe it was one of, if not the earliest, organizations of employers for the purpose of resisting the unreasonable and intolerable demands of labor of the kind that we employed. I think I am safe in saying to you, gentlemen, that until 1887, and beginning with 1872, there was not one year, scarcely one month, when we in our works did not hava a fight or strife of some kind to settle, and if we were able to make as much as 5 months' of actual working days a year we were doing very well. I speak of ourselves because our situation was very much akin to that of every other stove manufacturer. The stove molders and the stove mounters were people with whom there was no getting along, and the moulders' union and the stove mounters' union, to which they owed allegiance, were simply beyond all reason. Well, we organized ourselves into an association for the purpose of dealing exclusively with this labor question. About a year after we were organized we invited the International Moulders' Union to join with us once a year for two purposes: First, for the purpose of settling the wage scale; second, for the purpose of determining under what conditions work would be done in our shops. They very gladly accepted our invitation, and since 1888 we have met annually, fixed our differences and adopted a wage scale. I recall but one strike since that time in which the forces of our association and the forces of their association met in combat, and I need not tell you, gentlemen, that we licked them, horse. foot and dragoons,

cleaned them out, and it was not a long fight either. We had a meeting a couple of months ago in Cnicago where they resisted a reduction in wages. We felt we needed a reduction badly, and demanded 15 per cent.—I speak of this only because I want to give you some idea of the spirit which moves us manufacturers. We wanted a reduction because we felt that the conditions demanded and required it. They did not want to concede it. And in view of their good conduct and good behavior in the past, we manufacturers representing as we did a membership of over 150 firms with some $40,000,000 of actual capital, felt we would concede their wishes and not insist upon the reduction. It was not made, and we are continuing to pay the same wages. It may have been a mistake; but they had behaved so well and been so loyal to their engagements and so faithful that we made no change. Now in the East some of our people adopted the union label on their goods. We in the West found we were getting into a great deal of trouble with this union label because the workmen organized and got a great many people to ask for stoves with the union label. At the meeting this year we determined we would put an end to this union label. We said to them: "We have been meeting with you for 15 years, and have got along peaceably. You have introduced an element of discord. You have shaken the red flag in the faces of your friends. You have to stop. You have got to withdraw your label from the stove business. You cannot meet us in amicable conference and then introduce this element of discord." We talked and argued over it for two days and they decided that, so far as the stove industry is concerned, they would withdraw the union label. I think that matter is settled once and for all time. This is simply a practical statement of what may be accomplished when the employer and the employee meet together face to face, acting in absolute good faith, with perfect loyalty and with mutual recognition of each other's rights. There is no trouble, gentlemen, under these conditions, in getting along with 99 out of 100 laboring men. They are all good fellows; they all have big hearts. When you consider the sacrifices that most of these men are willing to make, that they do make in defense of what they believe to be their rights, you cannot help taking off your hat to them, saying: "You are heroes." They are misled. They have not the business training that we business men have. Their horizon is narrow. If you will take these men into your confidence and discuss your difficulties with them, giving them some ideas of your own conditions, take my word for it, the majority of them will help you. Do not under any conditions, Mr. Chairman, hold the vast body of American workmen responsible for the faults of some of the bad laborers they have at their heads. My statement would be simply that all these years during which I have had personally a vast amount of experience convince me there is one simple thing employers may do better than any other, to straighten out this labor trouble. My observation is the chief defect in our system is that we take anybody and everybody into our shops. We give them any position in our shops that is considered merely as labor, whether it be as mechanic, porter, engineer, or anything else, and we ask absolutely no questions as to the man's record. In other words, we hire men and put them in, asking nothing as to where they came from and what they did before. Now the employer with half a dozen people may do business in that way, or he may not; probably does not. But you have the large manufacturer who employs from 100 to 1,000 men or more, as some of us do, and when labor is scarce and he wants it—and even if he does not need it very badly—he will hire anybody that comes along if he can mount a stove, screw on pipe, or anything else, and ask no questions. I say to you, in my judgment, if the manufacturers in all lines of business would have an understanding, if that understanding did not go beyond the mere fact that they would not hire a man unless when he came along he was not only provided with his union card—I do not favor that. I do not say that that should be so. I speak of it only because a union man travels around with a card from the union to which he belongs, and before he has fairly put his foot into the shop and wants to know where his card is but that when he goes to the employer in the shop, let the employer, on the part of the association to which he belongs, ask for the card showing what shop the man came out of and that he is entitled to a certificate of good conduct. That is all you need. You have absolutely solved the labor question, so far as the employer is concerned. Offer a premium upon good conduct. You now not only offer no premiums upon good conduct, but you offer a premium upon bad conduct, because there is no incentive for a man to be good, if he is prone to be bad; and, unfortunately, most of us are bad rather than good. It is so with the working man. There is nothing immoral about such a requirement; neither is there anything illegal about it. It is strictly within the spirit of the labor union itself. If a man comes into my shop I should find out where he worked before and whether he behaved himself. That is the labor problem in a nutshell. Offer a premium upon good conduct. Give employment only to those who are not disturbers, and you have solved the labor problem. As has been said by the previous speaker, you always have labor troubles when business is rushing, when the demand for labor is urgent. The labor question cannot be solved by individual resistance. If you stand alone you can do nothing; if you are combined you may do something. But even that will not suffice. Profit sharing is only a makeshift. It has been only a temporary relief. It has not won out everywhere. It has been notably a failure in England. It did well in London. It was quite successful in Paris. The American Steel Company tried a little scheme a short time ago of having its men buy stocks, but that has been a failure. I think the United States Steel Company has been damned up hill and down on account of that thing more than anything else that has occurred in its history. It was supposed to be a selfish trick, and a great deal of ill-will is cherished because of it. Relief will have to come from somewhere else, and I believe the best possibilities for that relief exist in the spirit of consolidation, because the individual who has to fight his competitor and his labor as well is in bad shape, and consolidation can do a lot of things that the individual cannot do.

The President—Mr. Doherty, you took some part in the discussion at the Western Association meeting of Mr. Shelton's paper, and I should like to hear from you.

Mr. Doherty—Mr. President, the labor question is one that I have encountered in a great many cities and in a great many different situations. It is not a subject I feel able to talk upon. It puzzles me, and I have no solution to offer for the labor difficulties we all encounter. I have been spending a great deal of time in Colorado, and there has probably been no other locality more afflicted with labor unions to a greater extent than the State of Colorado. They have had a constant turmoil there for 14 years, and a great deal of hard feeling has been engendered. While I think the employers will be successful in their present fight, it will be a victory with some serious drawbacks. It will leave scars. The contributor of this paper said much that interested me, but I do not know that I would care to defend all he said or criticize anything he said. I feel that the most serious feature of organized labor is the attempt to curtail production. I do not look at high wages as in the least harmful to capital or to the capitalist. In fact, in our business, I believe we would be better off paying $5 a day for labor, if everybody else paid the same price. It makes more possibilities for our business. What is true of our business is true of other lines of business, but it cannot be shown as plainly as it can be in the gas business. I think some organized effort should be made to change the policy of the unions. That will have to be done by persuasion. It must be pointed out to them that in trying to curtail production they are handicapping their own future and the future of the country, and that no one is benefited. Another thing that has always appealed to me about the labor problem is the load factor, if I may speak of it as such. We all know we want to keep our plants running continuously. We cannot afford to have a big peak at one time in the year and nothing to do at some other time. True economy requires an even load. I think it is the duty of every employer and of every labor union to try to find some method whereby all can be employed continuously. I sometimes think that the employer who does most for our progress is that employer whose minimum pay roll most nearly equals his maximum. In times of prosperity there is a demand for labor, and some manufacturer springs up with the ability to employ a great many men temporarily. He offers the men large wages and attracts them from stable lines of business which can run continuously at the wages formerly paid, but which cannot make a living at the higher rate of wages. The result is that this manufacturer may be responsible for disturbing the whole labor condition, the economic condition of the country. I think the solution of the labor problem perhaps will be found to lie along scientific lines. The efforts we are now making are too fragmentary. They have no ultimate end in view. I believe the labor problem has never been properly or thoroughly treated. I have no very definite opinion, Mr. President, on the question as we generally discuss it. I may say I have tried profit sharing, and have not found it a universal panacea. I have tried all sorts of methods of getting along peaceably with labor, both union and otherwise. I do not think that any of the undertakings with which I have been connected have had more than their share of trouble, but I have seen trouble crop out under every possible condition where it was least expected. Last October I went to a strike in San Antonio, Tex., where we had conceded everything to our men for a number of years. We had done more for the progress of street railroad men than any other street rail-

road in the country, and yet the time came when we had to be a party to a very severe conflict. We had given up to them so long that they finally denied our right to exercise any authority whatever over the discharge of the men. They said we could only discharge the men when the grievance committee of the union agreed that they should be discharged. It got to be a question whether we or the workmen were to control the property, and the inevitable conflict came. It resulted in a disastrous strike where cars were dynamited and tracks torn up.

Mr. Jones—Mr. President, my experience with the labor problem has been as a mediator in the settling of differences between the companies which employed me and the men with whom I am associated; and it has been my endeavor to keep in touch with the men so as to understand them, what they deserved and what we could afford to do for them. In keeping in touch with the men I keep also in sympathy with them, so that I really do not feel toward the laborer as many others do. In the gas business, as I am connected with it, we do not employ very many men in any one place; and the difficulty of settling labor disputes in our smaller works, compared with other manufactories, is like the taking of candle power—it varies inversely as the square of the number of men employed. From time to time I have been called upon to settle differences, more or less important, concerning wages and hours, and in every instance I have been successful for the reason that I got to the level of the men; I have become one of them, talked the matter over impartially, only to find that the ordinary gas works employee is very reasonable. The gas business is peculiar inasmuch as we are compelled to make gas throughout the 24 hours, the demand for gas is erratic, and most gas companies are not provided with sufficient storage capacity to bridge them over many hours. Besides, the manufacturing apparatus installed is usually just about enough to supply the demand for gas. The labor difficulties have driven gas men to the construction of apparatus which will make a large amount of gas in a short time and to the installation of apparatus which requires very little labor to operate it. It will ultimately compel gas men to construct holders large enough to carry them over one day, so that the 8-hour problem will not be a serious one to them. The men will be the losers. Fewer men will be employed, the gas will be made in fewer hours and kept in store awaiting the demands of the consumer.

Mr. Lowe—I want to move a very hearty vote of thanks. We are always very much pleased to hear from our friend Symmes, who helps us out occasionally; and when he does, it is through a very valuable contribution. [Carried.]

(To be Continued.)

## Location of Electric Stations.

By Mr. Alton D. Adams, in *Elec. Engineer.*

Electrical supply stations were started in business centers, but are rapidly moving to river banks and seashores. During the first decade of electric lighting the prevailing idea in the location of generating stations seems to have been nearness to connected loads. To accomplish this object stations were generally built on expensive land near the business centers of cities and towns, where water could be drawn only from the public mains, and where fuel and ashes could be transported only in carts. In almost every city of New England one or more early stations were thus located.

A good example of this practice may be seen to-day in the original Edison station at Lawrence, which still carries regularly its load of lamps and motors. This station was located, in 1882, on one of the main streets close to the business center of the city, and continues to operate with the old-time equipment of small bipolar Edison dynamos belted to high speed engines. Every pound of coal must go to this station in carts, and any attempt to substitute compound condensing engines for those of the single cylinder type would be met with the objection that water can be had only from the city mains.

At Portland, Me., the first public lighting plant, installed early in 1882, was located in the main business section of the city. The same year saw public lighting plants installed in Lowell, Lynn and Springfield, not one of which was so located as to secure direct rail or water transportation of fuel, or with access to cheap condensing water. Moving from its rented space in a mill the lighting plant at Lowell, in 1883, was installed in a building on Middle street, now used for the manufacture of cigars. From its first home, in a shoe factory on Market street, in Lynn, the electric plant was moved to a station on Stewart street, where cheap transportation and free condensing water were equally lacking. The Springfield plant of 1882 was located in a basement in the business section of the city at a good distance from both the railway and the river. The Edison station built at Fall River, in 1883, was located on one of the main business streets, and the same spot is now occupied as the office of the present electric system. At New Bedford the Edison station of 1884 was located on Middle street, near the corner of Purchase, far from river and railway, and here again the present business office of the electric system is now on the site of the old generating plant. Aborn street, in the business district, was the site of the first electric station in Providence, R. I., and this station depended on fuel transported in carts.

Boston presents a notable instance of the former tendency to locate electric lighting stations without regard to cheap supplies of fuel and water. Of the 8 lighting stations operated in Boston before the end of 1888 every one was well removed from the railways and the harbor front. Beginning in the year 1883 the Brush lighting plant was located successively on Portland, Lancaster and Ferdinand streets. In the same year a plant of Thomson & Houston arc dynamos was started in the basement of Mechanics Building, on Huntington avenue, for public service, and two years later this plant was moved to 197 Congress street. Another station located on Stanhope street began operation at Boston in 1884, and was equipped with Weston dynamos. The first Edison station in the city was located in Head place and began operation on February 20, 1886. This station was then, as now, in the midst of a hotel and retail section of the city and made a rather long haul of fuel necessary. A little more than a year later, December, 1887, the second Edison plant was started on Hawkins street, a site no better than the first as to cheap transportation of fuel or free water for condensing engines.

The completion of this Hawkins street station may be said to close the era during which 8 plants, 3 using Brush, 2 using Thomson & Houston, 1 using Weston and 2 using Edison apparatus, had been located at points about the city where all fuel must be hauled in carts and all water must be bought. The next station reversed this policy. By a consolidation, in 1887, the Brush, Thomson & Houston and the Weston systems passed into the hands of the newly organized Boston Electric Light Company, and on December 31, 1888, that company started its new station at Gilman place and Summer street, on Fort Point Channel. This station was the first in Boston, and probably in New England, to secure free water for condensing engines and to take its coal directly from ships.

When, in 1891, the loads on the Edison system made a third station necessary, the lead of the Boston company was followed and the new plant was located on Atlantic avenue and the harbor front, at the foot of Pearl street, within less than 1,000 feet of the Gilman place and Summer street station. This third Edison station was started late in 1892, soon assumed the greater part of the load on the system, and continued to do most of the work down to the purchase of the system of the Bostom Electric Light Company by the Edison Company, in 1901.

The two stations last mentioned, of 1888 and 1892, solved the problem of free condensing water and cheap transportation for fuel, but the land about them had so high a value as seriously to burden their future expansion. A way out of this difficulty was sought by the Boston company in 1898, ten years after the Summer street station was built, by the erection of the L street plant, at South Boston, on land formerly occupied by the Harrison-Loring shipyard, and having a long harbor frontage.

Purchase of the Boston system by the Edison Company, in 1901, carried with it this L street plant, and the further purchase of some adjoining land provided ample room for expansion and for a large coal storage yard. Starting in 1883, in the heart of the business and residential districts of Boston, it took nearly a decade for electric lighting stations to reach the harbor front at points where real estate has high values for commercial purposes. The last 10 years has witnessed the further movement of the main generating stations of the Boston system out on the harbor lines to a point where the price of land permits their construction to be carried out on the most approved lines.

In other cities a similiar movement toward cheap land with free condensing water and direct boat or rail transportation has been made by electric stations. At Providence, R. I., instead of the two inland stations that formerly carried the lighting load, the work is now done by a single plant on the water front. The station at Newport, in the same State, is supplied with fuel from vessels at its own wharf. To the lighting plant at New Haven, Conn., both coal and condensing water come by way of the harbor, on which it is located.

Though transmitted water power supplies most of the electric energy distributed at Hartford, in the State just named, the construction of a new station on the bank of the Connecticut river is now under way to provide what steam power is wanted by the system. In Springfield,

Mass., the basement plant of early years long since gave place to a station with the railway at one side and the river last named on the other.

Even this well located steam station does only a small part of the work of the system, for most of the distributed energy is transmitted from water power. Following the same river right across the State brings one to Greenfield, which, though only a town, has its lighting station in the outskirts, with a pond of condensing water and a railway line on opposite sides.

The steam-driven plant at Lowell that carries the entire load of the electrical supply system there receives its coal in railway cars that run to the door, and pumps water for its condensing engines from the Concord River, on whose banks it stands. At Lawrence, though the old Edison station previously mentioned is kept at work, the later plant, driven partly by steam and partly by water power, stands on the bank of the Merrimac River and close to the railway.

The Haverhill station is on the water front of the same river, but is driven entirely by steam power. Still farther down stream, at Newburyport, the old station of 1887 that draws water only from the city mains is just being replaced by a new plant on a site where water for condensing is pumped from driven wells. At New Bedford the machinery from the Edison station in the midst of the retail district has been moved to a later plant on the river front, where condensing water is free and coal comes by the shipload. Similarly the lighting plant at Fall River has moved from the center of the business section to one side of the city, where a pond furnishes free condensing water. To the Lynn station on the water front coal comes by the shipload.

In all the stations above mentioned, save that on the river front at Lawrence, steam is the only prime mover, and the changes of location have been made to take advantage of free condensing water, cheap land or a low cost of transportation for fuel. In not one of these cases, so far as can now be recalled, has the change in location resulted in the substitution of water from some other source for that from city mains to feed the steam boilers. No doubt there are exceptional cases where such substitution has been made, but they are far from the general rule. The reason for the continued use of city water in boilers even where other sources of fresh water are available is no doubt the greater purity of the former and the consequent freedom from boiler incrustations.

At many stations the charge made for city water is a very small item in the expense of operation, because of the fact that the condensed steam is pumped back into the boilers and only a slight amount of waste and leakage has to be made good from the city mains.

[To be Continued.]

## ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

AT a recent meeting of the Board of Directors of the Madison County (N. Y.) Gas and Electric Company, Mr. Lawrence Barnum, of New York, was elected President, and Mr. C. W. Koiner, of Oneida, N. Y., was chosen General Manager.

MR. DENNIS HARRINGTON has been appointed Treasurer and Manager of the Commercial Gas Company, Bradford, Pa.

THE National Gas Company which supplies gas to the residents of Berkley, a suburb of Norfolk, Va., has been purchased by the City Gas Company, of Norfolk. It is understood that the consideration was $43,000, which would seem quite enough, remembering that the Berkley concern had nothing more than a distributing plant. It purchased gas from the Norfolk Company.

A CORRESPONDENT in Bridgeport, Conn., forwards the following:

"The Bridgeport Gas Light Company, on the 28th ult., ceased using its plant on Housatonic avenue to permit of the remodelling of the present buildings and the construction of others, the installation of a new equipment and much other new work, the effect of which will more than triple its present capacity. Although the plant was shut down on Sunday and is not running now, there is no truth to the report that the Company has abandoned it and will make gas in the West End plant. For the winter, and perhaps longer, the Company will make gas in the West End plant to supply the whole city. Water gas is made at that plant and the plans provide for the making of all coal gas in the Housatonic avenue plant and water gas in the other one. Thousands of dollars are to be expended in developing the Housatonic avenue plant. There is a large area of ground, first-class dockage and wharfage facilities and it also has good railroad connections. Superintendent Charles M. Gerdenier said, when asked about the changes, that extensive improvements were to be made to the Housatonic avenue plant and that it might take a year or 18 months to get them completed and in good running order. The plans are now being prepared. He said that a large amount will be expended but would not mention how much. When the plant is opened again the Company will materially increase its working forces."

THE gas plant at Albuquerque, New Mexico, is to be rebuilt.

THE Peoples Gas Light and Coke Company has notified the holders that the first mortgage bonds of the Hyde Park Gas Company are due and will be redeemed on demand.

MR. FRANK A. LEACH, Jr., has been appointed Resident-Manager of the Oakland (Cal.) Gas Light and Heat Company. For some years Mr. Leach acted as assistant to Mr. John A. Britton.

MR. H. E. SNIDER, Secretary of the Mount Pleasant (Ia.) Gas and Electric Company, informs us that the name of the Company hereafter will be the Mount Pleasant Gas Company, and that the capital stock has been reduced from $72,000 to $36,000.

THE proprietors of the Rahway (N. J.) Gas Light Company have arranged for the extension of their main system to Woodbridge.

ADVICES from Batavia, N. Y., dated September 2d, are to the effect that the plant and franchises of the Consolidated Gas and Electric Company, of Batavia, were sold by Referee Safford E. North in pursuance of a court order. Continuing, our correspondent says: "The property was purchased, after spirited bidding, by Seth W. Warren, of Buffalo, N. Y., representing the bondholders, who are residents of Buffalo. The price paid was $53,000, and the claim under which the sale was made amounted to $65,000. A protest against the sale was made by Mr. George Bowen, on behalf of Mr. Frederick M. Harris, of Boston. Mr. James O'Malley, of Buffalo, representing Western people, was the only bidder against Mr. Warren. It is understood that as soon as the legal formalities are complied with a new operating company will be formed and the plant will be improved."

THE Lycoming electric station of the Cincinnati Gas and Electric Company is to be shut down, the supply of the district to be carried on from the Cincinnati Company's main station.

A. L. BARBER, writing from Denver, Col., under date of September 1st, says: "The Poudre River Valley Gas Company, of Fort Collins, Col., has awarded a contract for the construction of a gas plant at Fort Collins to Frank English, of Boulder. The Company is capitalized in $75,000, and it is proposed to construct a works up to an output of 300,000 cubic feet per day. It is also said that the works will be in operation by January 1st. The officers of the Company are: President, Mr. James B. Arthur; Vice-President, Mr. Frank F. Stover; Secretary and Treasurer, Mr. Frank English."

MR. S. E. PAINE will retire from the service of the Iowa City (Ia.) Gas Company, January 1st. He has been connected with the Company since 1857.

GAS was supplied to the residents of Egg Harbor City, N. J., the evening of the 1st inst.

A CORRESPONDENT in New Haven, Conn., writing under date of August 31st, says: "In the reorganization of the executive management of the New London (Conn.) Gas and Electric Company the officers chosen were: President, Augustus Brandegee; Vice-President, James Hislop; Secretary, W. G. Bushnell; Treasurer, A. M. Young; General Manager, F. M. Tait.

THE annual report of Mr. E. G. Runyan, Inspector of Gas and Meters for the District of Columbia, was submitted to the Commissioners about a fortnight ago. He states that 780 official photometric tests of the gas supplied by the Washington Gas Light Company made during the year gave an average illuminating power equal to 22.66 standard

candles, 0.66 above the legal requirement. The average of 218 tests in the northwest laboratory, located at 1335 14th street northwest, was 22.74 candles. The average of 265 tests in the southeast laboratory, located at 5th and D streets southeast, was 22.49 candles. The Inspector states that on 51 occasions during the year the gas of this Company was below the legal requirement of 22 candles. He states that most of the defaults occurred during the months of December, January and February, at the time the Company was using as an enricher a gas oil heavier than the grade of naphtha formerly employed for this purpose.

"Representatives of the Company," says Mr. Runyan, "stated that they were unable to secure the grade of naphtha formerly used and were obliged to use the heavier oil instead. It was soon evident that satisfactory results could not be obtained with the new oil without some changes in the gas works. Minor changes were made from day to day, in the hope of overcoming the difficulties. Some of the changes gave promise, for a time, of yielding satisfactory results, but each one showed after a thorough trial that it could not be relied upon to convert this heavy oil into a fixed gas of satisfactory illuminating power. To accomplish this result it would be necessary to make extensive changes in the plant, changes which it would be impossible to make and meanwhile maintain the daily output of gas demanded at that season of the year. About this time a representative of the Company stated that the Company had been able to again secure the grade of naphtha formerly used, and since then the only defaults in candle power have been temporary ones, due to unavoidable accidents."

According to the report, the average amount of ammonia found in 100 cubic feet of gas at the central laboratory was 13-100ths of 1 grain. The highest amount found was 2.10 grains. On 97 occasions the test showed no ammonia present. The average amount of ammonia found in 100 feet of gas at the southeast laboratory was 1.19 grains. The highest amount found was 5.58 grains, on November 2, 1903. This was the only time during the year when the test in any laboratory showed more than the legal limit of 5 grains in 100 feet. On 19 occasions the test in this laboratory showed no ammonia present. The average amount of sulphur in any form found in the gas at the central laboratory was 8.30 grains in 100 feet. The largest amount found was 11.92 grains and the smallest was 3.32 grains. The average amount of sulphur found in the gas at the southeast laboratory was 6.95 grains in 100 feet. The largest amount was 12.78 grains and the smallest 3.11 grains. At no time during the year, says the Inspector, did the gas supplied by ihe Washington Gas Light Company contain more than the legal limit of 20 grains in 100 feet. On 22 occasions sulphuretted hydrogen was found in the gas supplied by the Washington Gas Light Company. Nineteen of these defaults occurred in January, and were traced to a defective valve in the purifying house. Continuing, the Inspector says:

"Three hundred official photometric tests of the gas supplied by the Georgetown Gas Light Company were made in the laboratory at 1226 32d street northwest, with a mean illuminating power of 23.34 standard candles, which is 1.34 candles above the legal requirement. The maximum was 26.57 candles, and the minimum 18.50 candles. On 21 occasions during the year the candle power fell below the legal requirement of 22 candles. The average amount of ammonia found in 100 cubic feet of gas supplied by the Georgetown Gas Light Company was 74-100 of 1 grain. The largest amount was 4.38 grains. On 21 occasions the test showed no ammonia present. At no time during the year did the test in this laboratory show ammonia present in excess of the legal limit of 5 grains in 100 feet. The mean amount of sulphur in any form found in the Georgetown gas was 13.36 grains in 100 feet. The maximum amount found was 21.47 grains, on March 24, 1904. This was the only time during the year that the total sulphur exceeded the legal limit of 20 grains in 100 feet. The minimum amount of sulphur found was 5.07 grains. Tests for sulphuretted hydrogen showed this objectionable compound present in 66 occasions during the year. The fault seemed to be in the limited capacity of the purifying department of the works. To remedy this defect the Company in the latter part of the winter made arrangements to practically double the purifying capacity, but the new purifiers were not completely installed and ready for use before the end of the fiscal year. It is believed that the purifying department as now equipped will be able to remove the last trace of the sulphuretted hydrogen from the gas." With reference to the gas supplied by the two Companies the report states:

"The gas supplied by the Washington Gas Light Company is a mixture of coal gas and water gas, while that supplied by the Georgetown Gas Light Company is a coal gas enriched with naphtha. The gas supplied by both Companies was of good quality and up to the statutory requirements, with the exceptions noted in this report."

THE following is from a recent issue of the Springfield (Ills.) *News*: "Mr. Emil G. Schmidt, in answering the question propounded to him by members of the City Council recently in regard to the quality of the gas furnished by the Springfield Gas Light Company, said that he never had and never expected to see the time when the people would not be 'kicking on the gas.' If you will ask any other man who has had experience in the gas business in regard to the truth of this statement he will corroborate it without hesitation. The kicks are pretty evenly divided as a rule between the quality of the gas and the size of the bills. It very often happens that at the end of the month a gas bill is smaller than was expected, but then nobody ever 'kicks' about that. It is true that poor service is often due to lack of pressure in the mains, but when it comes to over-consumption that is likely to be due to one or two causes. Either the Company has used too much pressure, thereby forcing more gas through the meters than can be properly burned, or the consumer has been careless in the use of gas and has wasted it needlessly. A man who has had some experience in the gas business said in discussing the matter the other day: 'Of course it is not in the interest of the gas men to advise people too strenuously along lines that will lead to a reduction of the consumption of gas, but nevertheless it is true that every consumer has his remedy largely in his own hands. It is really astonishing how few people can and do read their own meters, and yet a child can read a gas meter without difficulty, after it is shown how. If a man will keep one eye on his meter and one hand on a monkey wrench he can save lots of gas by simply regulating the pressure. It is better to have a good pressure than a poor one, but there is one thing sure that if the gas pressure is too high there is more gas being forced through the burners than can be burned, and that much light or heat is being lost, though the gas has to be paid for just the same.' In substance, he gave the following information under a too high pressure of gas: The lighting of a jet means a sudden hissing sound from the flame and its breaking out into tips and points of sputtering light, such as will break the globe surrounding the blaze if the flow is not cut down. The whole center of the flame will be dark and of the bluish tone of the range blaze. It will show the maximum of heat and the minimum of light. Ordinarily the householder is satisfied when, by closing up the vent at the tip, he has reduced the flaring flame. But this is not enough. To the extent that there is undue pressure in the mains there is undue consumption of gas in the tip, and with a consequent loss of light, brought about by the dark center of the flame. The remedy is at the gas meter in the basement. There it will be found that the full opening from the service pipes outside is on. This pipe from outside may be 2 inches outside diameter, feeding into house pipes of ¾ inch inside diameter. The cut-off pipe leading to the meter will be recognized in a moment by anyone; it is designed to turn the two holes in the two ends of the cock together in shutting off, so that a padlock may fasten these ends. Take a wrench and turn the loose end of the cock toward the hole in the other end, and have someone upstairs light a gas jet to the full and signal the moment when you have cut off just enough of the superfluous flow. This is when the jet, opened to the full, gives a clear, steady, rounded light. A child will recognize the condition. Ordinarily the gas company is not the corporate ogre that the consumer of gas is led to imagine. The gas consumer often is the creator of his own ills. The gas range is the prolific cause of big bills. The cook flares a flame to the full in order to hurry pot or kettle to the boil. When the boiling point is reached she may recognize that it will be economy to turn the flame half off or more, leaving only enough to maintain the boiling; she may not know that even in the beginning the flaring on of the full flame is sending perhaps half the heat of the burner into the room without a fragmentary effect upon the kettle. A pot or kettle that is about the diameter of the burner at the bottom allows great quantities of heat to rise toward the ceiling without having a particle of effect toward heating the kettle's contents. Again, a sooty burner in a range becomes clogged in its openings, and the gas that forces through, burning at a dull white, is lacking in heat. The green flame shows the maximum of heat, and it may be taken for granted that just as the flame varies from this it is burning at a loss to the consumer."

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THE plant of the Athens (O.) Gas Company has been purchased by a syndicate of Michigan capitalists who propose to reconstruct the same. The executive management of the Company, as named by the present owners, is: President, C. B. Kelsey, of Grand Rapids; Secretary and Treasurer, J. F. Young, same city.

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THE proprietors of the Atlantic City (N. J.) Gas and Water Company will construct a very handsome building for office purposes on Michigan avenue, north of Atlantic. A well known physician of "the City," who is also a Director in the Company, says that its new office quarters will be superior to those he now occupies.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
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NOTIFICATION RESPECTING ADVERTISING.
Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:
New York—American News Co., 39 and 41 Chambers St.
*Germany*—Lemcke & Buechner, of New York.
*England*—Aug. Siegle, 30 Lime Street, London.

MONDAY, SEPTEMBER 12, 1904.

## The Market for Gas Securities.

The trading in Consolidated Gas for the week was very brisk and it was all done at advancing prices. The net result for the week was a gain of 7½ points, the closing to-day (Friday) being reported at 202½ to 202¾. Rumor again has it that the Directors are considering the advisability of increasing the dividend to 10 per cent. per annum, but our belief is that nothing of the sort is at all likely. The condensed balance sheet of the Company for the half year ended June 30 last shows a credit to surplus of close to $19,000,000. The Company's business increases at an amazing rate.

Brooklyn Union is 220 bid, and it should be 250 bid, which point we once more assert it will reach before the New Year. Peoples, of Chicago, is 103¾ bid, and Cincinnati gas is 107½. The bullish feeling and action in Baltimore gas show no abatement. Laclede preferred is 80 bid. The securities of the Public Service Corporation of New Jersey all show marked advances.

## Gas Stocks.

**Quotations by George W. Close, Broker and Dealer in Gas Stocks.**

16 WALL STREET, NEW YORK CITY.

SEPTEMBER 12.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

| *N. Y. City Companies.* | *Capital.* | *Par.* | *Bid.* | *Asked.* |
|---|---|---|---|---|
| Consolidated | $73,177,000 | 100 | 202¼ | 202¾ |
| Central Union, Bonds, 5's. | 3,000,000 | 1,000 | 106½ | 106¾ |
| Equitable Bonds, 6's | 1,000,000 | 1,000 | 105 | .. |
| " 1st Con. 5's | 2,300,000 | 1,000 | 118 | 120 |
| Metropolitan | 658,000 | .. | 108 | 112 |
| Mutual | 3,500,000 | 100 | 270 | 300 |
| Municipal Bonds | 750,000 | .. | .. | .. |
| New Amsterdam Gas Co.. Bonds, 5's | 11,000,000 | 1,000 | 107¼ | 109 |
| New York & Richmond Gas Co. (Staten Island) | 1,500,000 | 100 | 35 | .. |
| 1st Mtg. Gold Bds. 5 p. ct. | 1,000,000 | .. | . | .. |
| Northern Union, Bonds, 5's. | 1,250,000 | 1,000 | 102¼ | 105½ |
| New York and East River.. | | | | |
| Bonds 1st 5's | 3,500,000 | 1,000 | 111 | 113 |
| " 1st Con. 5's | 1,500,000 | .. | 106 | 108 |
| Standard | 5,000,000 | 100 | 125 | 13 |
| Preferred | 5,000,000 | 100 | 145 | 155 |
| Bonds, 1st Mortgage, 5's | 1,500,000 | 1,000 | 116 | 117 |
| Yonkers | 299,650 | 500 | 130 | .. |
| *Out-of-Town Companies.* | | | | |
| Brooklyn Union | 15,000,000 | 100 | 220 | 223 |
| " " Bonds (5's) | 15 000,000 | 1,000 | 113 | 115 |
| Bay State | 50,000,000 | 50 | — | — |
| " Income Bonds | 2,000,000 | 1,000 | .. | 75 |
| Binghamton Gas Works,.. | 450,000 | 100 | 28 | 30 |
| " 1st Mtg.5's | 509,000 | 1,000 | 93 | 96 |
| Boston United Gas Co.— | | | | |
| 1st Series S. F. Trust | 7,000,000 | 1,000 | 82 | 85 |
| 2d " " " | 3,000,000 | 1,000 | 47½ | 50 |
| Buffalo City Gas Co. | 5,500,000 | 100 | 3¾ | 4 |
| " " Bonds, 5's | 5,250,000 | 1,000 | 128¾ | . |
| Capital, Sacramento | 500,000 | 50 | .. | 35 |
| Bonds (6's) | 150,000 | 1,000 | .. | .. |
| Chicago Gas Co. Guaranteed Gold Bonds | 7,650,000 | 1,000 | 104 | 104¼ |
| Cincinnati Gas and Electric Co | 29,500,000 | 100 | 107 | 107¼ |
| Columbus (O.) Gas Co., 1st Mortgage Bonds | 1,500,000 | 1,000 | 97½ | 99 |
| Columbus (O.) Gas Lt. & Heating Co | 1,682,750 | 100 | 88¾ | 89¼ |
| Preferred | 3,026,500 | 100 | 107½ | 109 |
| Consumers, Toronto | 2,000,000 | 50 | 200 | 204 |
| Consolidated, Baltimore | 11,000,000 | 100 | 81⅛ | .. |
| Mortgage, 6's | 3,600,000 | .. | .. | 118 |
| Chesapeake, 1st 6's. | 1,000,000 | .. | .. | .. |
| Equitable, 1st 6's. | 910,000 | .. | .. | .. |
| Consolidated, 1st 5's | 1,490 000 | .. | .. | 112 |
| Consolidated Gas Co. of N.J. | 1,000,000 | 100 | 15 | 17 |
| " Con. Mtg. 5's | 880,000 | 1,000 | 86 | 90 |
| Consolidated G. & E. Co.'s. | | | | |
| Little Falls, N.Y. | 90,000 | 100 | .. | 100 |
| Bonds | 75,000 | .. | .. | 100 |
| Detroit City Gas Co. | 4,825,500 | 50 | .. | 50 |
| " Prior Lien 5's | 5,603,000 | 1,000 | 99½ | 100 |
| Detroit Gas Co., 5's | 361,000 | 1,000 | 75 | 75¼ |
| " Inc. 5's | 16,000 | 100 | 98½ | 100 |
| Equitable Gas & Fuel Co., Chicago, Bonds | 2,000,000 | 1,000 | .. | 101 |
| Essex and Hudson Gas Co. | 6,500,000 | .. | 39 | 40 |
| Fort Wayne | 2,000,000 | .. | .. | .. |
| " Bonds | 2,000,000 | .. | 55 | .. |
| Grand Rapids Gas Lt. Co. 1st Mtg.5's | 1,225,000 | 1,000 | 104½ | 105 |
| Hartford | 750,000 | 25 | 190 | 200 |
| Hudson County Gas Co., of New Jersey | 10,500,000 | .. | 78 | 80 |
| " Bonds, 5's | 10,500,000 | .. | 105¼ | 106 |
| Indianapolis | 2,000,000 | .. | 60 | 70 |
| " Bonds, 6's | 2,650,000 | .. | 103½ | 103½ |
| Jackson Gas Co | 250,000 | 50 | 73 | 75 |
| " 1st Mtg. 5's | 290,000 | 1,000 | 101 | 102¼ |
| Kansas City Gas Light Co., of Missouri | 5,000,000 | 100 | .. | 36 |
| Bonds, 1st 5's | 3,822,000 | 1,000 | 102 | 104 |
| Laclede, St. Louis | 10,000,000 | 100 | .. | .. |
| Preferred | 2,500,000 | 100 | 80 | 100 |
| Bonds | 10,000,000 | 1,000 | 109½ | 110 |
| Lafayette Gas Co., Ind. | 1,000,000 | 100 | .. | 60 |
| Bonds | 1,000,000 | 1,000 | 60 | 65 |
| Louisville | 2,570,000 | 50 | 138 | 140 |
| Madison Gas & Elec. Co. | | | | |
| " 1st Mtg. 6's | 350,000 | 1,000 | 107½ | 108¼ |
| " 6 per cent. scrip, due 1910 | 100,000 | 25 | 85 | 87 |
| Montreal, Canada | 2,000,000 | 100 | 218 | 218¾ |
| Nashville Gas Lt. Co. | 1,000,000 | 100 | 110 | .. |
| Newark, N. J., Con. Gas Co. | 5,000,000 | .. | 56 | 58 |
| Bonds, 6's | 4,000,000 | .. | 105 | 105¾ |
| New Haven | 1,000,000 | 25 | 64 | 70 |
| Peoples G. L. & Coke Co., of Chicago | 25,000,000 | 100 | 103¾ | 103⅞ |
| Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage | 20,100,000 | 1,000 | .. | .. |
| 2d " | 2,500,000 | 1,000 | 104 | . |
| Rochester Gas & Elec. Co.. | 2,150,000 | 50 | 88 | .. |
| Preferred | 2,150,000 | 50 | 118 | .. |
| Consolidated 5's | 2,000,000 | .. | 87½ | 90 |
| San Francisco, Cal. | 15,800,000 | 100 | 58½ | 58¾ |
| St. Joseph Gas Co. | | | | |
| " 1st Mtg. 5's | 751,000 | 1,000 | 92 | 96½ |
| St. Paul Gas Light Co. | 1,500,000 | 100 | 45 | 47 |
| 1st Mortgage 6's | 650,000 | 1,000 | 113 | 116 |
| Extension, 6's | 600,000 | 1,000 | 112½ | 115 |
| General Mortgage, 5's | 2,465,000 | 1,000 | 92 | 93 |
| Syracuse, N. Y. | 1,975,000 | 100 | 46 | 48 |
| Bonds | 2,047 000 | 1,000 | 94 | 96 |
| Washington, D. C | 2,600,000 | 20 | 288¾ | 289½ |
| First mortgage 6's | 600,000 | .. | .. | .. |
| Western, Milwaukee | 4,000,000 | .. | .. | .. |
| Wilmington, Del. | 600.000 | 50 | 230 | .. |

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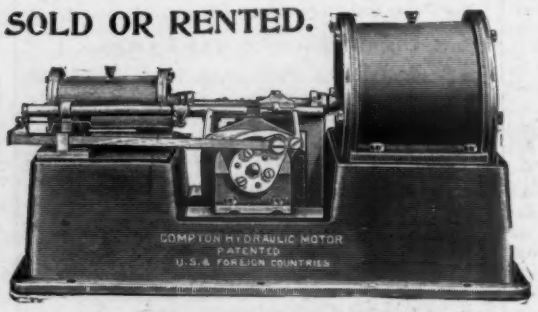


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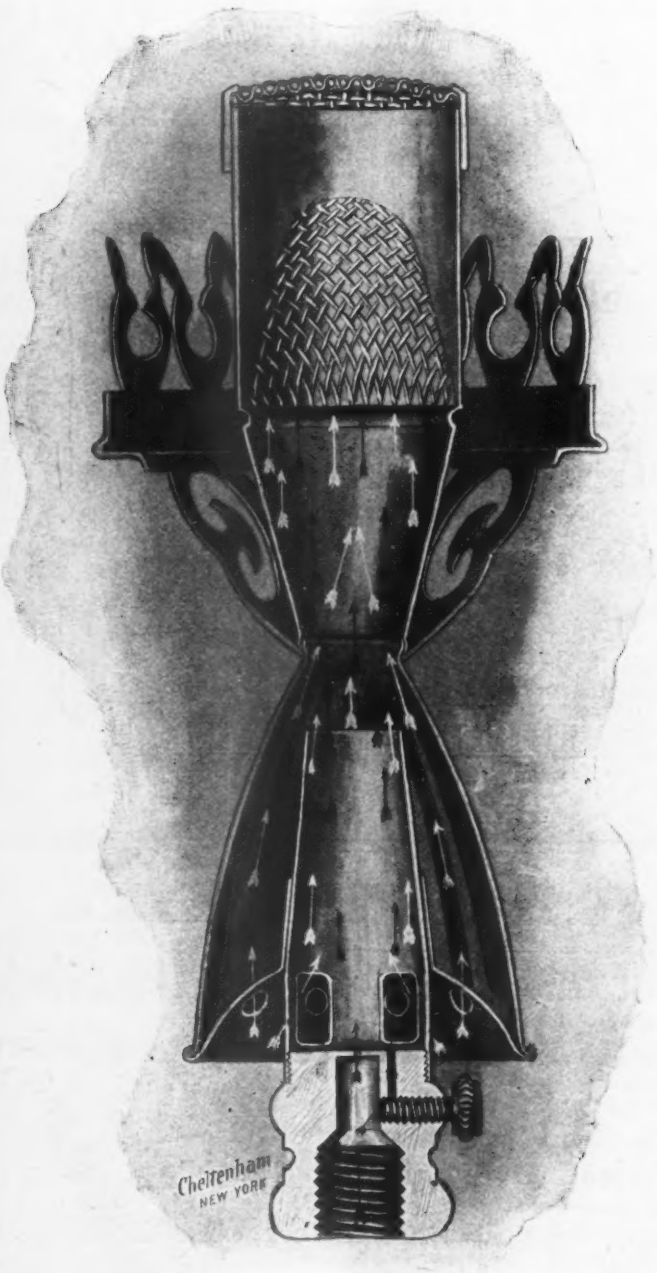


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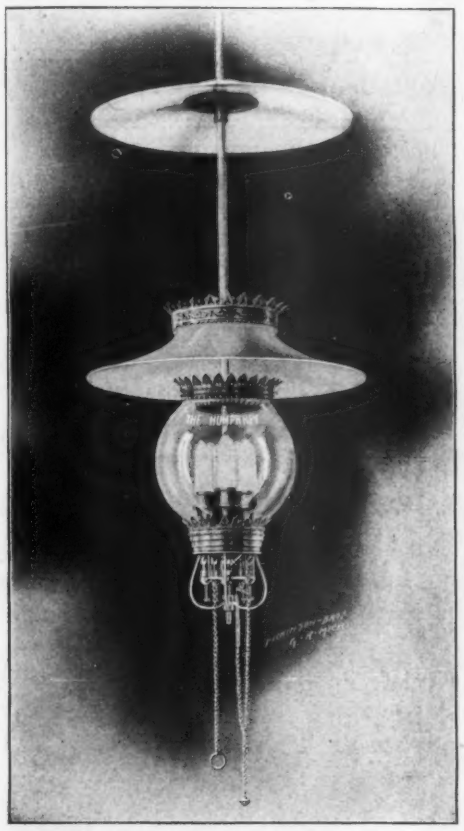

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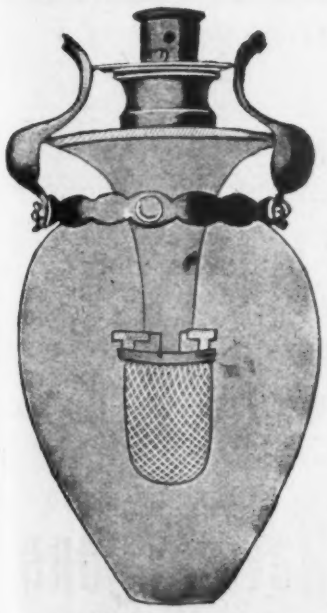

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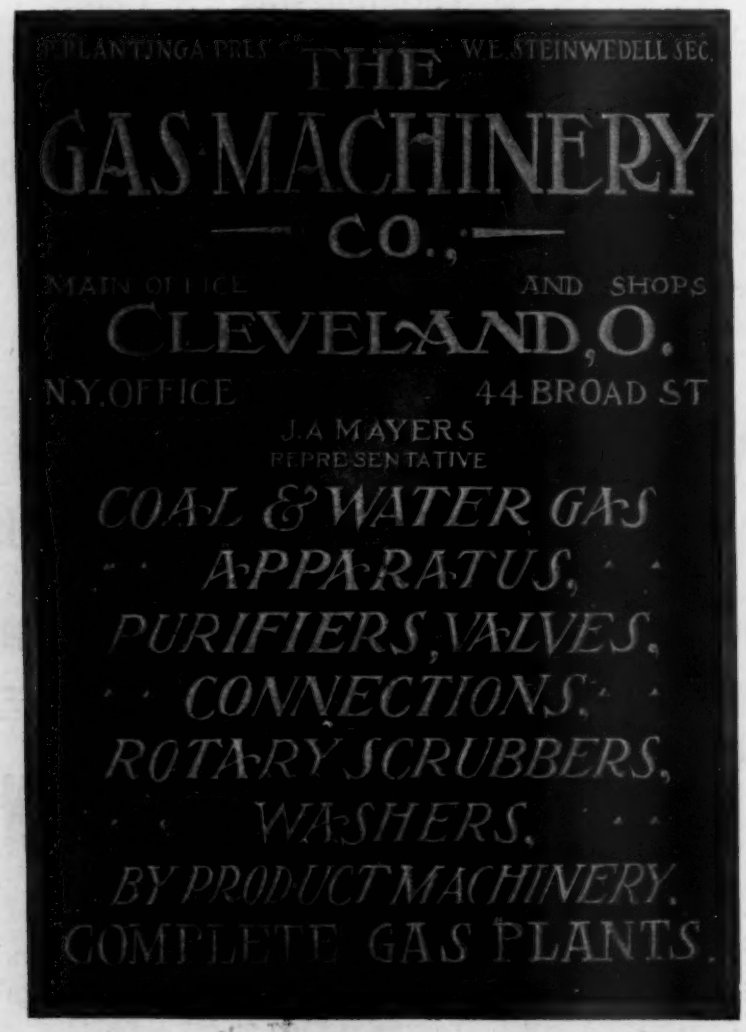


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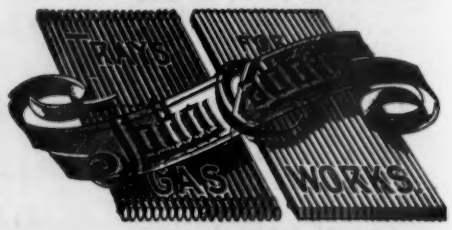


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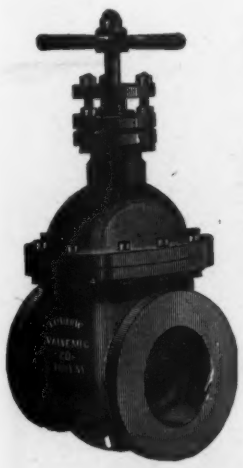

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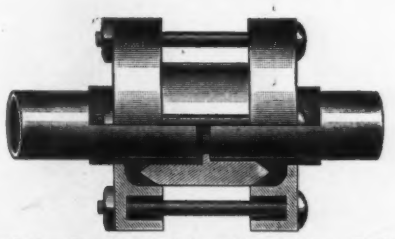

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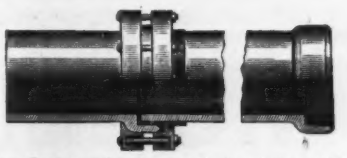

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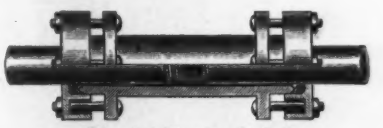

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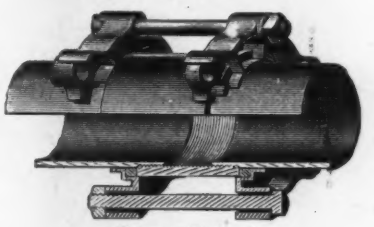

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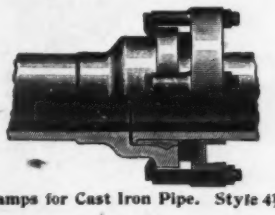

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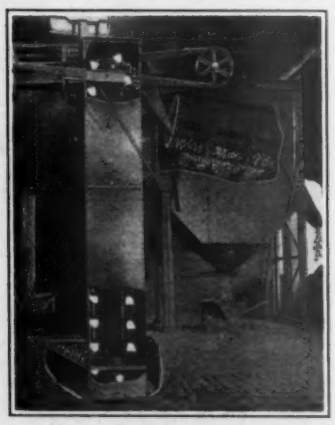

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*Link Belt methods save more than money.*

**LINK-BELT ENGINEERING COMPANY, Philadelphia.**

*NEW YORK:* 49 Dey St. *PITTSBURG:* Park Bldg. *CHICAGO:* Link-Belt Machinery Co.

C. W. HUNT COMPANY
SOLE MANUFACTURERS
OF "INDUSTRIAL" RAILWAY
CARS, TRACK, SWITCHES, TURNTABLES, ETC.
IN STOCK FOR IMMEDIATE SHIPMENT.
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—IN—

**GAS MANUFACTURE,**

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# Gas Analyses of All Sorts and Conditions,

—OR—

**Analyses of Solid and Liquid Materials as Well,**

That are needed by Gas Companies at any time in the conduct of their business, may be obtained from

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# LLOYD CONSTRUCTION COMPANY,
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# GAS WORKS BUILDERS.

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C-1146.

The strength of brass depends upon its composition—the more copper the more strength for a given weight.

Mueller Gas Cocks are made of red brass, which has the largest amount of copper of any brass alloy. They are strong without being excessively heavy.

Mueller Gas Cocks are made in straight, oval and round way patterns; the straight being made in the standard, extra and special grades, the oval in the extra grade only, and the round in the standard and extra grades. The cock illustrated is the straight way, special grade cock.

Each cock is carefully inspected and assembled, is given a working test as near like actual service use as possible, bears the Mueller trade mark, and is *unconditionally guaranteed.*

We also make tapping machines and meter connections for gas works' use. Catalogues upon application.

**Mueller Gas Cocks are on exhibit in the Palace of Manufactures, World's Fair.**

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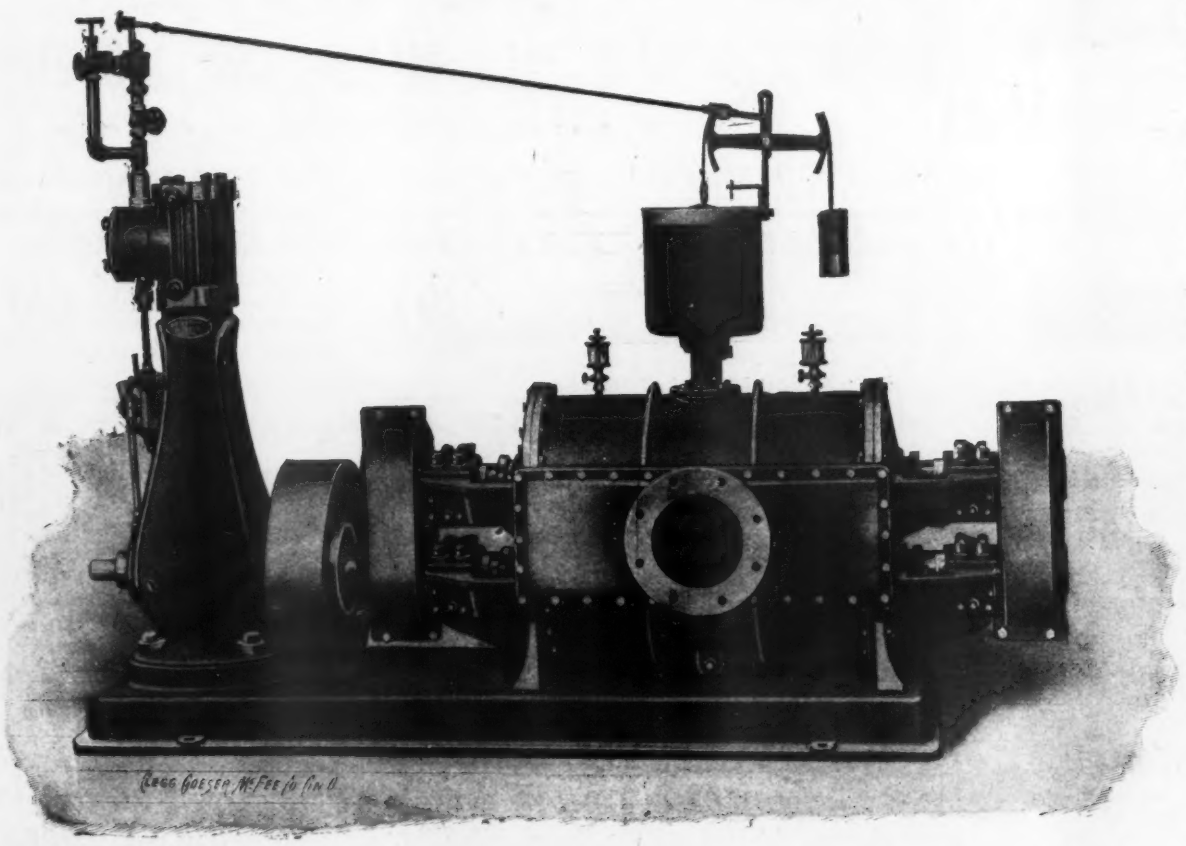

Sizes for any required capacity.

Self-oiling, adjustable bronze bearings.

Most perfect and sensitive Governor.

Write for Catalogue.

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## Means More Hot Baths.

Furnish your consumers the easiest, quickest, cleanest and most economical means of securing Hot Baths by recommending or selling the

## Humphrey Crescent Instantaneous Water Heaters.

Price, $16 to $45, GUARANTEED.

The No. 6, price $25, here illustrated, will heat three gallons of water per minute 50° in temperature, supplying a large family at any time with all the Hot Baths wanted.

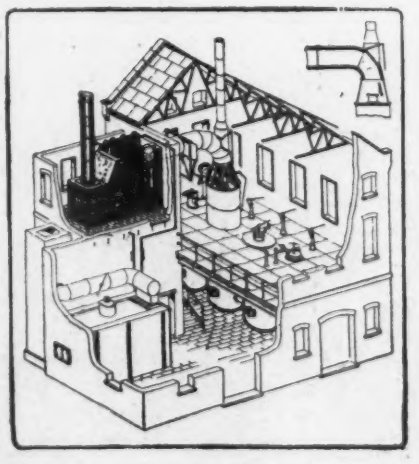
We Make Quick Shipments.

Send to-day for prices to **HUMPHREY CO., Kalamazoo, Mich.**

# Economize Heat in Water Gas Plants,

BY UTILIZING A

# Green's Economizer,



To absorb the heat now going to waste when you blow through your superheater to heat the feed water for your boilers to the temperature of the steam. This is now being done at the Poughkeepsie Gas Works, Poughkeepsie, N. Y.

Write for full particulars how this is accomplished, the saving effected, and the advantages gained, to the

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MANUFACTURERS OF
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FLANGE
GAS AND WATER PIPE
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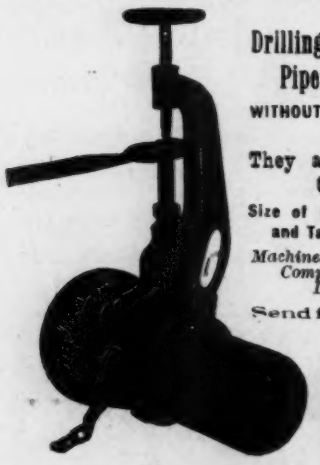
MANUFACTURERS OF
CAST IRON PIPE AND SPECIAL CASTINGS
FOR WATER AND GAS.
Also, FLANGE PIPE, LAMP POSTS, Etc.

GAS TAPPING MACHINES
—FOR—
Drilling and Tapping Pipe under Pressure
WITHOUT ANY ESCAPE OF GAS.
They are Strong and Compact.
Size of Combination Drills and Taps ¾ to 4-inch.
*Machines Sent to any Gas Company for Thirty Days' Trial.*
Send for Circulars.



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Consulting Engineers.
Builders of UP-TO-DATE Machinery and Appliances for Coal and Water Gas Plants. :: :: :: :: ::
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AND ESTIMATES
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Established 1856. Works at Phillipsburgh, N. J.
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CAST IRON WATER AND GAS PIPE,
FROM THREE TO FORTY-EIGHT INCHES DIAMETER. ALSO, ALL SIZES OF
Flange Pipe for Sugar House and Mine Work. Branches, Bends, Retorts, etc., etc.

NO LEAKY JOINTS IN UNIVERSAL PIPE.

Specially adaptable for—
High and Low Pressure Gas Mains.
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Manufacturers of Lead Pipe, Solder, etc., and Jobbers of Plumbers' and Tinners' Goods.
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SAFETY GAS MAIN STOPPER COMPANY,
For Shutting Off Gas in Mains
Temporarily during alterations and repairs. : : : :
Any size gas main can be shut off in 30 seconds. : : :

STOPPERS SENT ON TRIAL.
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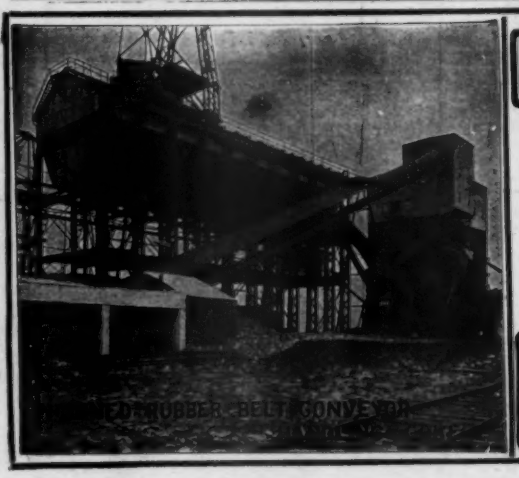
FINE OPENING
GRATE BARS
FOR GAS WORKS.
STATIONARY, SHAKING, DUMPING.
BARS FOR HAZELTON BOILERS.



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EQUIPPED WITH
BALL BEARING ROLLS
ARE THE BEST,
because they possess greater efficiency, consume less power, and the belts last longer than when any other type of roll is employed.
PLANS AND ESTIMATES FURNISHED ON REQUEST.
The Link-Belt Machinery Co.
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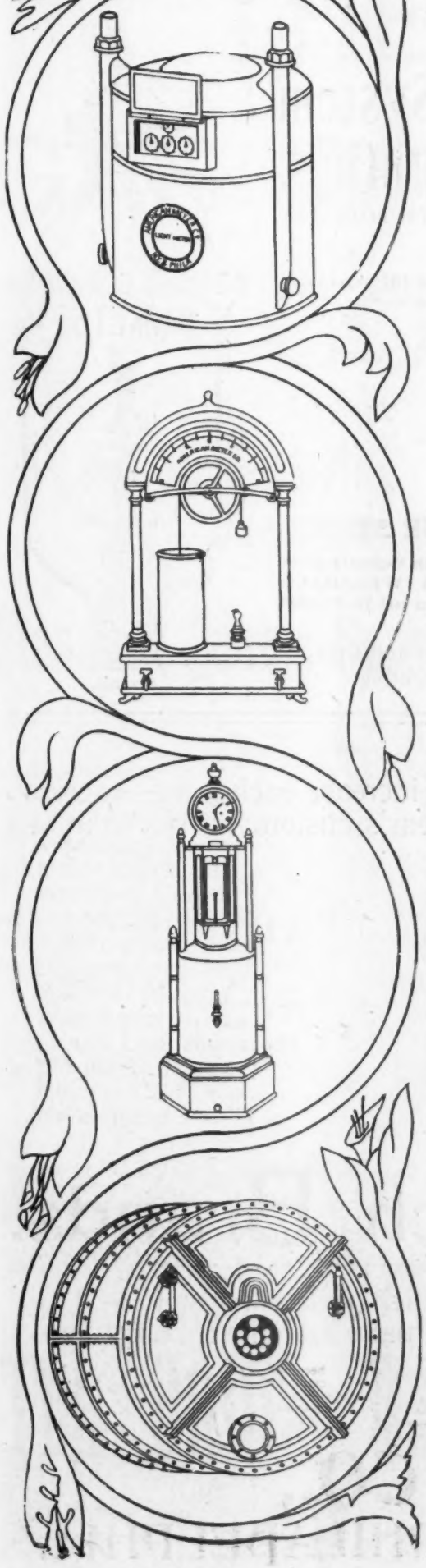
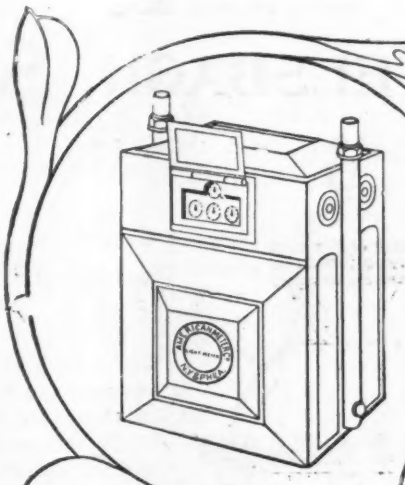
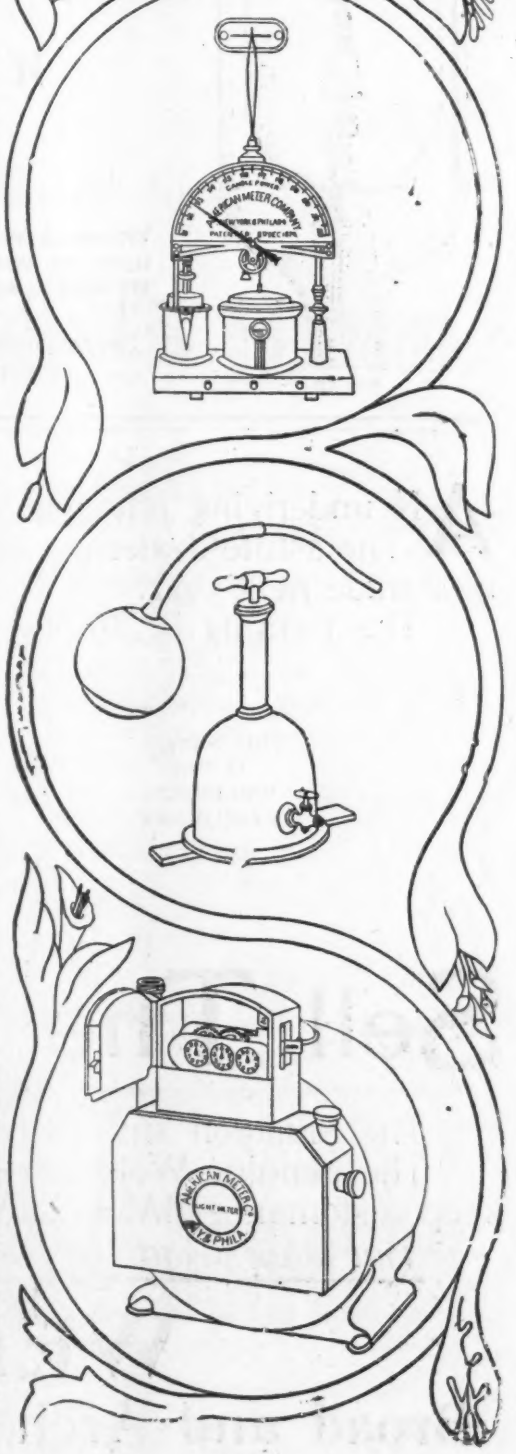
ESTABLISHED 1836. INCORPORATED 1863.

NEW YORK,
PHILADELPHIA,
CHICAGO,
ST LOUIS,
SAN FRANCISCO.







## PUBLIC LIGHTING TABLE.

### SEPTEMBER, 1904.

| Day of Week. | Date. | Table No. 1. Following the Moon. Light. | Table No. 1. Following the Moon. Extinguish. | Table No. 2. New York City. All Night Lighting. Light. | Table No. 2. New York City. All Night Lighting. Extinguish. |
|---|---|---|---|---|---|
| | | | | P.M. | A.M. |
| Thu. | 1 | 7.00 PM | 11.10 PM | 6.30 | 4.20 |
| Fri. | 2 | 7.00 LQ | 11.50 | 6.30 | 4.20 |
| Sat. | 3 | 7.00 | 12.40 AM | 6.15 | 4.30 |
| Sun. | 4 | 6.50 | 1.30 | 6.15 | 4.30 |
| Mon. | 5 | 6.50 | 2.40 | 6.15 | 4.30 |
| Tue. | 6 | 6.50 | 4.30 | 6.15 | 4.30 |
| Wed. | 7 | 6.50 | 4.30 | 6.15 | 4.30 |
| Thu. | 8 | 6.50 | 4.30 | 6.15 | 4.30 |
| Fri. | 9 | 6.50 NM | 4.30 | 6.15 | 4.30 |
| Sat. | 10 | 6.50 | 4.30 | 6.05 | 4.40 |
| Sun. | 11 | 6.40 | 4.40 | 6.05 | 4.40 |
| Mon. | 12 | 6.40 | 4.40 | 6.05 | 4.40 |
| Tue. | 13 | 6.40 | 4.40 | 6.05 | 4.40 |
| Wed. | 14 | 8.40 | 4.40 | 6.05 | 4.40 |
| Thu. | 15 | 9.20 | 4.40 | 6.05 | 4.40 |
| Fri. | 16 | 10.10 FQ | 4.40 | 6.05 | 4.40 |
| Sat. | 17 | 11.00 | 4.40 | 5.55 | 4.50 |
| Sun. | 18 | 12.00 | 4.50 | 5.55 | 4.50 |
| Mon. | 19 | 12.50 AM | 4.50 | 5.55 | 4.50 |
| Tue. | 20 | 1.50 | 4.50 | 5.55 | 4.50 |
| Wed. | 21 | 2.40 | 4.50 | 5.55 | 4.50 |
| Thu. | 22 | 3.40 | 4.50 | 5.55 | 4.50 |
| Fri. | 23 | No L. | No L. | 5.55 | 4.50 |
| Sat. | 24 | No L. FM | No L. | 5.40 | 5.00 |
| Sun. | 25 | No L. | No L. | 5.40 | 5.00 |
| Mon. | 26 | 6.20 PM | 8.00 PM | 5.40 | 5.00 |
| Tue. | 27 | 6.20 | 8.30 | 5.40 | 5.00 |
| Wed. | 28 | 6.20 | 9.10 | 5.40 | 5.00 |
| Thu. | 29 | 6.20 | 9.50 | 5.40 | 5.00 |
| Fri. | 30 | 6.20 | 10.40 | 5.40 | 5.00 |





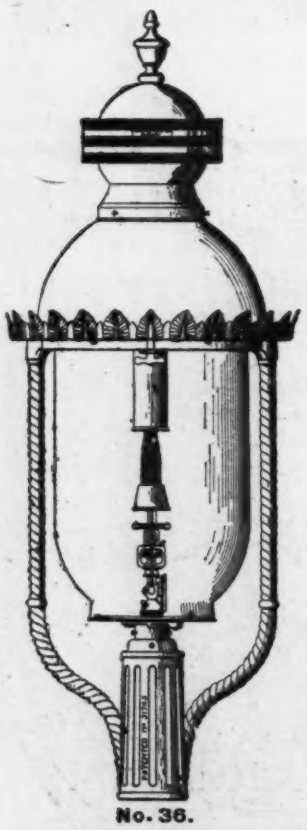
## TOTAL HOURS LIGHTING DURING 1904.

| By Table No. 1. | Hrs. Min. | By Table No. 2. | Hrs. Min. |
|---|---|---|---|
| January | 225.00 | January | 423.20 |
| February | 205.40 | February | 367.40 |
| March | 187.40 | March | 355.35 |
| April | 169.50 | April | 298.50 |
| May | 152.30 | May | 264.50 |
| June | 137.20 | June | 234.25 |
| July | 138.50 | July | 243.45 |
| August | 151.00 | August | 280.25 |
| September | 164.40 | September | 321.15 |
| October | 191.30 | October | 374.30 |
| November | 210.30 | November | 401.40 |
| December | 237.10 | December | 433.45 |
| Total, yr. | 2171.40 | Total, yr. | 4000.00 |

NEW YORK, 97 Liberty Street. BOSTON, 814 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, Foot of Orleans Street. SAN FRANCISCO, 712 Polk Street.

# WELSBACH STREET LIGHTING COMPANY

.... OF AMERICA ....



No. 36.

Controls and Operates the

## Welsbach System of Street Lighting,

Which includes its specially DESIGNED AND PATENTED BURNER for STREET and PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.

No. 38.

AN underlying principle in business is to show an increase each year---to grow. The astute dealer not only seeks to retain this year's customers, but to attract new trade next year.

The formula is simple-

THIS SHIELD IS THE WELSBACH TRADE MARK.

IT IS A GUARANTEE AND A PROTECTION.

# Sell The Welsbach Brands.

The imitation stuff is bad for the customer---which is bad for you.

The genuine Welsbachs---Burners or Mantles---make satisfied customers---keep customers---MAKE NEW ONES.

*And your profit isn't merely dollars and cents.*

## WELSBACH CO.,

**Broad and Arch Sts., PHILADELPHIA.**

# THE UNITED GAS IMPROVEMENT COMPANY

For the Year Ending December 31, 1903. has been Awarded Contracts in the Following Places for

## Standard Double-Superheater Lowe Water Gas Apparatus.

| | | |
|---|---|---|
| Rochester, N. Y. | Chester, Pa. | Savannah, Ga. |
| Baltimore, Md. | Lynn, Mass. | New York (Central Union Co.) |
| Chicago, Ills. | Newark, N. J. | Cicero, Ills. |
| Amesbury, Mass. | Washington, D. C. | Chicago (Ogden Co.) |
| Aberdeen, S. D. | Boone, Ia. | Easton, Pa. |
| Winsted, Conn. | Pueblo, Col. | Lawrence, Mass. |
| Canon City, Col. | Charlotte, N. C. | Council Bluffs, Ia. |
| Schenectady, N. Y. | Fall River, Mass. | Chattanooga, Tenn. |
| Hagerstown, Md. | Duluth, Minn. | Tuckerton, N. J. |
| Malden, Mass. | New York (Mutual Co.) | Springfield, O. |
| Bridgeport, Conn. | Waltham, Mass. | Easton, Pa. (2d contract) |
| Albert Lea, Minn. | Dover, Del. | Mobile, Ala. |
| Brooklyn, N. Y. | York, Pa. | Conshohocken, Pa. |
| Kansas City, Kas. | Minneapolis, Minn. | Mason City, Ia. |
| Hempstead, N. Y. | Allentown, Pa. | |

TOTAL SETS FOR 1903, . . . . . 62
TOTAL DAILY CAPACITY, . . . . . 62,950,000 cubic feet.
TOTAL SETS TO DATE, . . . . . 508
TOTAL DAILY CAPACITY, . . . . . 362,780,000 cubic feet.

# The United Gas Improvement Company,

Broad and Arch Streets, Philadelphia.

Established 1858. Incorporated 1890.
CHAS. E. GREGORY, Prest. DAVID R. DALY, V.-Prest. & Treas.
H. D. ABERNETHY, Sec.

**J. H. Gautier & Co.**

Greene & Essex Streets,
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MANUFACTURERS OF

CLAY GAS RETORTS, FIRE CLAY TILES,
FIRE BRICK and FIRE CLAY SPECIALTIES.

Ground Fire Clay, Fire Sand and Ground Fire Brick in Barrels and Bulk.

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FLEMMING GENERATOR GAS FURNACE

**Brooklyn Fire Brick Works,**

OFFICE AND WORKS:
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MANUFACTURERS OF

CLAY GAS RETORTS & SETTINGS, GENERATOR LININGS. SPECIALTIES.

Established 1854. Incorporated 1869.

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**Fire Brick Manufg. Co.,**

Manufacturers of { GAS RETORTS . .
FIRE BRICK . . .
RETORT SETTINGS

Water Gas Cupola Linings, Fire Clay, Etc.

Proprietors for the U. S., Coze System of Inclined Benches.

*Estimates Furnished on Application for Most Successful Style of Construction.*

Also for Free-Firing and Full and Half-Depth Regenerative Benches, for Burning either Coal or Coke in the Furnaces.

Office:
Cor. Manchester and Sulphur Avenues, St. Louis, Mo.

Established 1845. Reorganized 1902.

**The Kreischer Brick Mfg. Co.,**

Manufacturers of the very best quality of Clay Retorts, Blocks, Tiles, Settings and Firebrick of every description.

Also Miners and Shippers of Fireclay, Fire Sand, Ground Brick in Barrels.

WORKS: KREISCHERVILLE, STATEN ISLAND.
OFFICE: 119 E. 23D STREET, NEW YORK CITY.

**Adam Weber Sons.**

GENERAL OFFICES: Park Row Bldg., N. Y. City
DEPOT & WAREHOUSES: 639 E. 15th St., N. Y. City
WORKS: Weber, N. J.

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**Modern Coal Gas Plants,**

*With either Horizontal, Inclined or Vertical Retorts.*

PATENTS APPLIED FOR.

No. 1. Firing horizontal benches with pulverized fuel, with either 8 or 10 retorts in 1 setting, using one furnace for two benches. Great saving in labor, fuel and life of retorts and settings. No elaboration of complex recuperation.

No. 2. Independent retort settings, taking all weight from retorts.

No. 3. Vertical retorts with vertical charge and discharge. Sixteen retorts in one bench.

**MODERN BENCH IRONWORK.**

ISAAC C. BAXTER, President.
Works, LOCKPORT STATION, PA.

ESTABLISHED 1864.

**JAMES GARDNER, JR., CO.,**

Successor to WILLIAM GARDNER & SON.

PETER YOUNG, Sec'y and Treas.
Address all communications to JAMES GARDNER, JR., CO., Room 202 Lewis B'l'dg. PITTSBURGH, PA.

**Fire Clay Goods for Gas Works.**

**HENRY MAURER & SON,**

(ESTABLISHED 1856.)

EXCELSIOR FIRE BRICK & CLAY

**RETORT WORKS**

WORKS, Perth Amboy, N. J.
OFFICE, 418 to 422 East 23d St., N. Y.

**Clay Gas Retorts,**
BENCH SETTINGS,
Fire Brick, Tiles, Etc.

**GEROULD'S IMPROVED RETORT CEMENT**

A Cement of great value for patching retorts, putting on mouthpieces, making up all bench-work joints, lining blast furnaces and cupolas. This cement is mixed ready for use. Economic and thorough in its work. Fully warranted to stick.

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In Kegs, 100 to 200 " " 6 " "
In Kegs less than 100 " " 7 " "

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For orders East of Buffalo, N. Y., or Pittsburg, Pa., freight will be paid to these points.

Bristol's Recording
**PRESSURE GAUGE.**

For continuous records of **Street Gas Pressure.** Simple in construction, accurate in operation and low in price.

Fully Guaranteed. Send for Circulars.

**THE BRISTOL CO.,**
Waterbury, Conn.

Silver Medal, Paris Exposition.

**GASHOLDER TANKS AND GAS WORKS MASONRY COMPLETE.**

Plans prepared and Estimates furnished at short notice.

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THEO. J. SMITH, Prest. J. A. TAYLOR, Sec.
A. LAMBLA, Vice-Prest. and Supt.

**BALTIMORE**
**RETORT & FIRE BRICK CO.**

MANUFACTORY AT
LOCUST POINT, BALTIMORE, MD.

**Clay Retorts, Blocks & Tiles**

**FIRE BRICK, FIRE CLAY, AND FIRE CEMENT.**

Our Improved Half and Full Depth Benches have been Adopted by Many Gas Companies.

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Sole Agents for New England States.

JOHN DELL,
*President and General Manager.*

**MISSOURI FIRE BRICK CO.,**

ESTABLISHED 1882.

MANUFACTURERS OF

**Gas Retorts, Bench Settings, Fire Brick, Cupola Linings, Etc.**

*We are the* **Exclusive Agents** *for the* **Mitchell Patent Benches,** *Constructed with Half or Full Depth Furnaces, to Burn either Coal or Coke, and Arranged for Front or* **Rear Clinkering.** **The Mitchell** *is the* **Original Coal Firing Bench.** *We also Erect Plain Benches with* **One** *to* **Six Retorts.**

YOUR CORRESPONDENCE IS RESPECTFULLY SOLICITED.

City Office:
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*Continental Bank,*
ST. LOUIS, MO.

# Bronder Patent Stoking Machinery.

**Three-Scoop and Three-Rake Charging and Discharging Machines** are operating in New York, Newark, N. J., Philadelphia, Worcester, Mass., Mt. Vernon, N. Y., Toronto and Montreal, Canada.

**Four-Scoop and Four-Rake Charging and Discharging Machines** are operating in Detroit, Mich.

These are the only machines that will draw or charge simultaneously 3 or 4 retorts (vertically) and handle from 42 to 60 retorts in from 25 to 30 minutes, lid opening and closing and filling of furnaces included.

**Hot Coke Conveyor, Quencher and Steam Exhauster,** operating in Toronto, Canada, working in water-sealed flue, rollers being protected from heat and grit.

COAL CRUSHERS, CONVEYORS AND BINS. TURNTABLES FOR MACHINES.

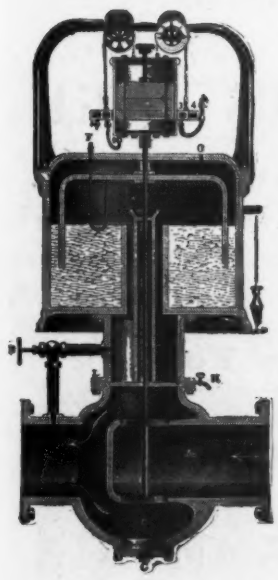
**Labor-Saving Machines for Handling Coal and Coke from Coal Cars to Coke Yard or Bins, a Specialty.**

**G. A. BRONDER,**

**Contracting Engineer and Builder,**

229 BROADWAY, NEW YORK.

# CONNELLY IRON SPONGE AND GOVERNOR CO.,



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## Coal Gas Apparatus.

**Automatic, Balance and Service Gas Governors.**
**Roots Improved Gas Exhausters.**
**Iron Sponge for Gas Purification.**
**Jones Jet Photometers, Pressure Registers, etc.**

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Manufacturers of

## Triple, Double and Single=Lift Gasholders,

With or Without Metal Tanks,

Oil and Water Tanks, Purifier Covers, General Plate Metal Work, and Steel Water Towers.

Plans, Specifications and Estimates Promptly Furnished on Request.

**PRACTICAL PHOTOMETRY,**

By WILLIAM JOSEPH DIBDIN,

PRICE, $3. FOR SALE BY

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**The Gas Engineer's Laboratory Handbook,**

By JOHN HORNBY, F.I.C.

Price, $2.50.

A. M. CALLENDER & CO., 42 Pine St., N. Y. City.

JAMES D. PERKINS, President. F. SEAVERNS, Treasurer.

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## Old Kentucky Shale and O. K. Boghead.

SHIPMENTS FROM NEW YORK, PHILADELPHIA, BALTIMORE AND NORFOLK.

## BERWIND-WHITE COAL MINING COMPANY'S

## Ocean Westmoreland Gas Coal.

**Offices:**
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Betz Building, Philadelphia.

**STRICTLY** High Grade. . . . . .
Carefully Prepared.
For Gas Making or
Heavy Steaming. .

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THE JEFFREY SYSTEM
**OF COAL AND ASH HANDLING IS**
RAPIDLY SUPPLANTING OLD-TIME METHODS.

Centrally Hung
BUCKET CONVEYOR
and
TRAVELING CHUTE for FEEDING STOKERS are FEATURES of this POWER HOUSE EQUIPMENT.

Catalogues free on
ELEVATING, CONVEYING, POWER TRANSMITTING,
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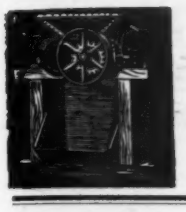

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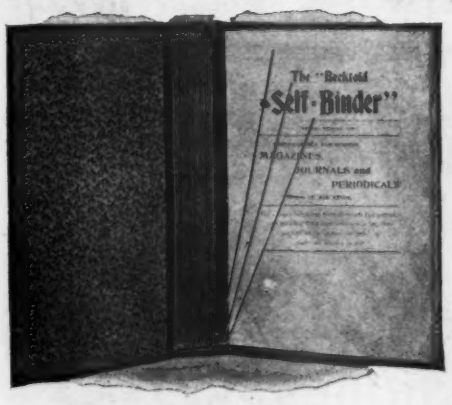


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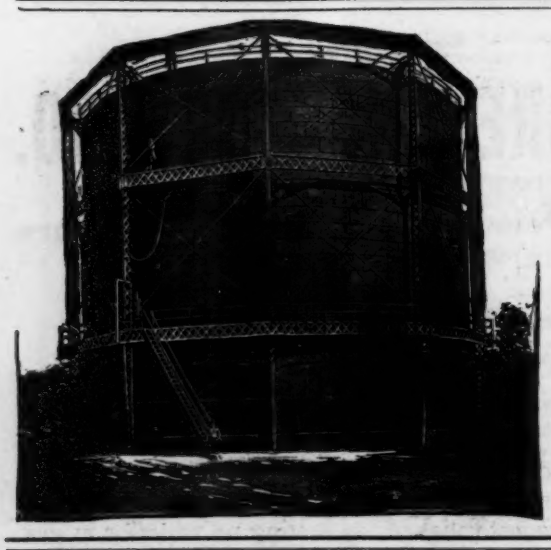

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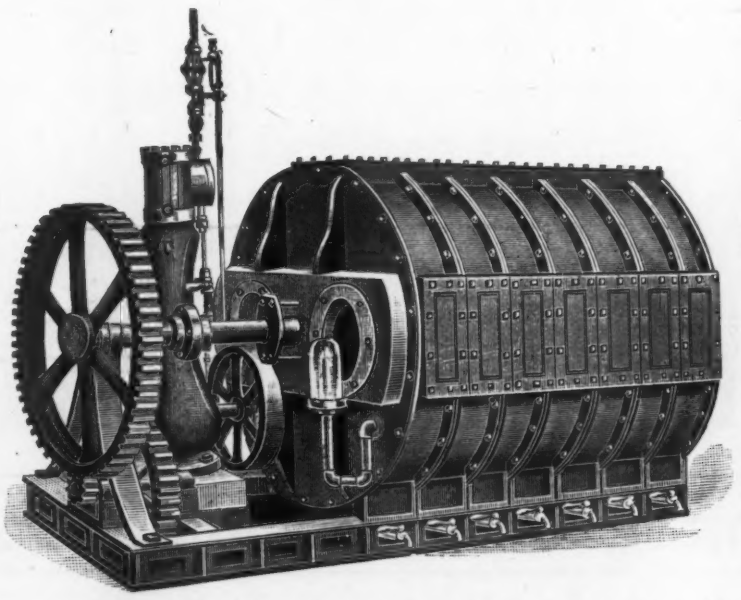

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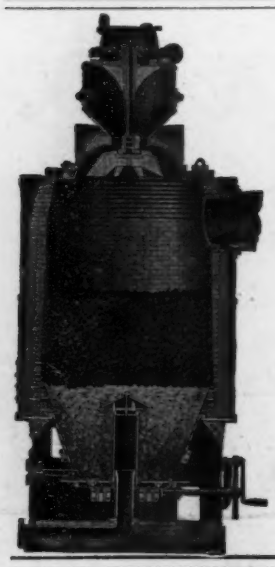

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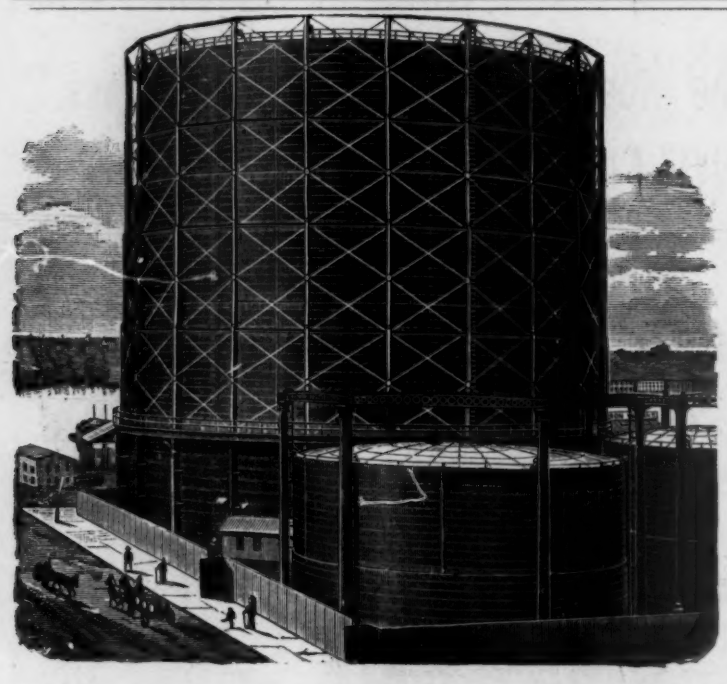

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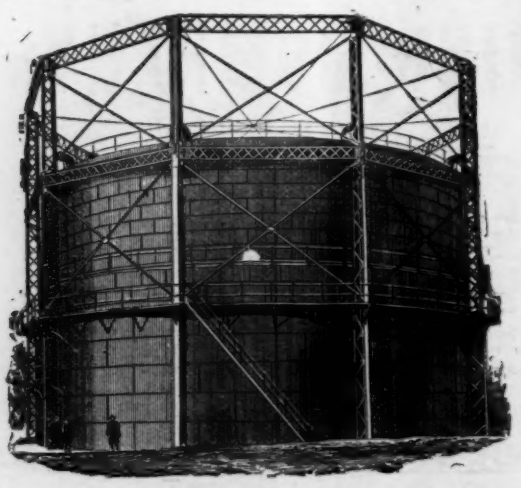

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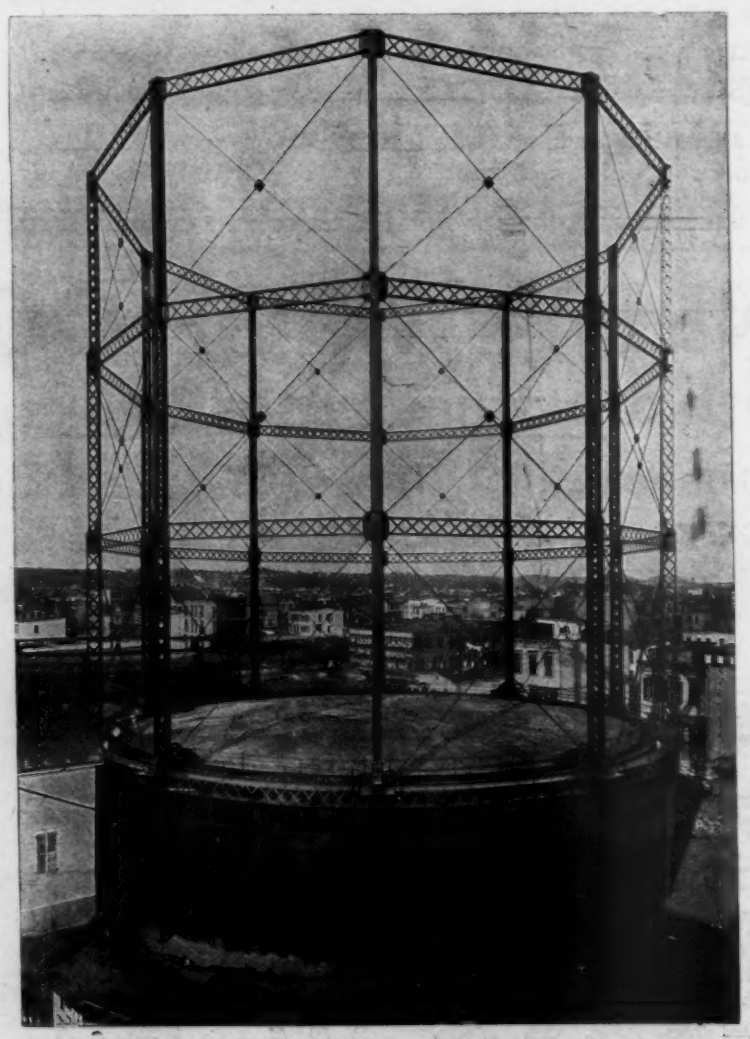

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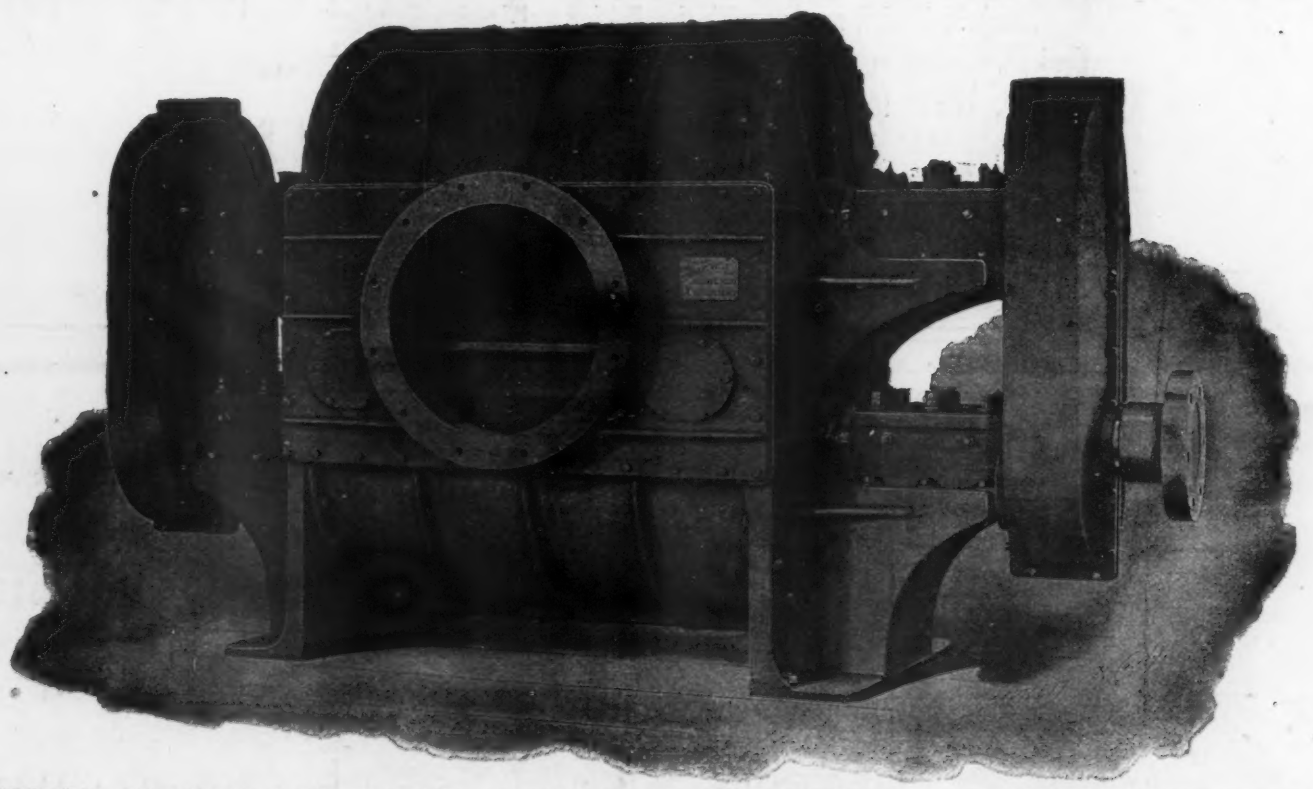

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